JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

June in Dublin.

ALTHOUGH only in the second week of March, the Council of the Institution of Gas Engineers are already turning our thoughts to Dublin, and raising anticipations of a delightful visit and of a profitable meeting. Of this we may be sure, that the traditional warm-heartedness of the capital city of Ireland to organizations having for their end and aim the progress of the useful arts, will in every way be observed on the present occasion. There is only one regret, and it is that the Engineering Conference organized by the Institution of Civil Engineers has been arranged for the same week in London. But the attraction it holds out for gas men will, we think and hope, be insufficient to in any way affect the attendance at the Dublin meeting. The work of an engineer engaged in gas supply, it is true, laps over from the particular to the general—or, to put it another way, from his main line there are many spur lines to other fields of engineering activity. But, after all, the greater and imposing part of his work is centralized; and when choice is offered, he must needs go to the quarter that holds out for him the largest amount of promise associated with his special interests. So far as we have yet learned, the programme that is being arranged for the Engineering Conference in London will not contain a great deal that is of immediate concern to the gas engineer and manager. Up to the present, we are informed, only one gas subject has been entered, and that is on gas heating. Our information does not extend to the particular aspect to be taken in treating the subject; and the term presents such an amplitude of cover that, till more definite information is to hand, we cannot say whether its treatment will have importance from the commercial, the hygienic, or the engineering aspect. If either or both of the former, then we believe in every opportunity being taken to advertise gas, and we should be the last to suggest that the opportunity be missed. But from whatever standpoint the question is to be discussed, and important as every standpoint is, the question and importance are not sufficient in themselves to divert presence and interest from the many-featured meeting in Dublin. In saying this, we would not have it thought that we regard the two fixtures as antagonistic. They are only so in the matter of time. It is unfortunate; but the arrangements are such that there cannot possibly be any deviation from the arranged dates for the Dublin meeting. In Dublin, then, for a few days beginning with Tuesday, June 18, the greatest interest will lie for the engineers and managers of the gas industry.

The President of the Institution (Mr. Charles Hunt, M.Inst.C.E.) and the Council have meditated long and worked well to produce a programme worthy and characteristically suitable for the forthcoming meeting. The Gas Section of the Dublin Exhibition will in itself largely direct consideration to the commercial work of the industry; and the conjunction of the exhibition and the meeting naturally suggested that the proceedings at the latter should have a distinctiveness in regard to the utilization of gas, while at the same time not by any means neglecting production. The programme, so far as it relates to much of the technical part of the meeting, is yet, of course, only in a provisional stage, until the Council have considered any further offers of papers that may be made before the end of the present month. Therefore, the names of authors and the titles of papers are withheld for the time being. But we can indicate something as to the subjects which will, it is expected, be dealt with.

In the first place, nothing need be advanced here to raise expectations as to the address with which the President will inaugurate the meeting. We have had abundant experience of the quality of presidential utterances by Mr. Hunt. In him are embodied the gas engineer, gas maker, and gas administrator of long, extensive, and comprehensive practice; and we shall again sip of the cream of his mature practical and scientific knowledge. Then the Council have booked Professor Vivian B. Lewes to lecture on "The Use of Gas "from a Hygienic Standpoint." The ever-popular lecturer will command a hearty welcome; and it may be confidently said that the lecture will send a few deadly shafts into the misconception and error that exist, and help to bring about the dissolution of the immoral inexactitudes that the competitors of gas are so assiduous in propagating. It is understood that altogether seven or eight papers have been before the Council; and, through certain of them, conjunction will again be effected with the exhibition, in the treatment of questions affecting gas heating and incandescent lighting, and also on the general subject of the sale of gas. It will from this be seen that the trading side of the gas industry—the side upon which business is done in the staple product—will be presented in such manner as to give plenty of opportunity for consideration and for a valuable harvesting of experiences. Turning to engineering questions, it is highly probable—perhaps we might speak with even a little more certainty—that the members will have the gratification of welcoming from America a paper on the high-pressure system of gas distribution as there practised. It is on the carpet, too, that vertical retorts—being the particularly live subject of the day in gas-engineering polemics—will for the second year running have their problems and trial discoveries submitted for examination and dissection. There will be contributions on the analogous subject of coke-oven practice; and, in view of this, the President's paper on the question before the Institution of Gas Engineers in 1896, and that of Dr. Schniewind before the Gas Section of the International Engineering Congress in Glasgow in 1901, with the subsequent publications of information since in the "JOURNAL," will be useful in suggestion and for comparison purposes. The use of tar for road improvement will also be discussed; and this will give an opportunity, for the commercial benefit of the bye-product, of accentuating merit for this particular purpose, and doing something to assist in driving interest among those road authorities who sleep heavily in their contentment with old-fashioned notions under new conditions. Among the authors of papers will be a representative of the gas profession in Ireland.

From the information here given, with that supplied in a circular which the Secretary of the Institution (Mr. Walter T. Dunn) has issued on behalf of the Council, it is clear that the Council have arrangements well in hand that will only require to be supplemented by the loyal support of the members to their own central organization to make the meeting in every way an unqualified success. In settling the details of the meeting, the Council have the co-operation of Messrs. George Airth, R. Bruce Anderson, Francis T. Cotton, T. J. Reid (Ballina), and James Whimster; and it may therefore be taken, with such heads and local knowledge and influence assisting, that there will be a finished completeness about the plans and the proceedings—from the time that the Right Hon. the Lord Mayor of Dublin (Mr. Joseph P. Nannetti) welcomes the Institution in the name of the city. Special visits to the exhibition are projected, so that there will be ample opportunity for inspecting the exhibits, especially those in the Gas Section, and the lighting of the grounds. It is expected that the gas lighting, in the favourable situations secured, will be a big attraction. The social events will include an invitation to the members to a luncheon, by the Directors of the Alliance and Dublin Consumers' Gas Company, possibly on the second day of the meeting. There will also be a reception on the Thursday evening; and various excursions, to suit all tastes and desires, are being organized for the Friday. Every day will have its engagements. For those who are able to extend their visit beyond this, it is understood that arrangements are contemplated for an excursion to the

Lakes of Killarney—starting on the Saturday, and returning early the following week. The Council are also employed with negotiations at the present time which, it is hoped, will eventuate in a considerable saving being effected in the travelling expenses of members. This much can definitely be said in regard to locomotion about the city, that the Dublin United Tramways Company will issue free passes over their system throughout the meeting; and their generosity to the visitors will be much appreciated.

We cannot, with such a programme before us, look forward to the annual meeting with anything but pleasurable anticipation, and confident hope of an abundant success.

The Gas-Coal Position.

Reports from the coal-selling centres during the past fortnight have not been quite so confident in tone respecting gas and other coals as they had invariably been in the few immediately preceding weeks; and there are indications of a little easier tendency, although every endeavour is being made by the colliery proprietors to sustain their exorbitant prices. Present position and outlook appear to be more or less bright, according to the amount of polish that the ability of the market reporters enables them to put upon their descriptive statements; but, bringing judgment to bear upon discrepancies in this respect and in quotations, the conclusion is arrived at that, for some reason or other, the firmness and the still ascending views of a few weeks ago have been put in check. Requirements for coal have worn down considerably. With milder weather, householders are not so pressed for supplies, and are indisposed to pay the current high rates for stocking their cellars. The needs of gas manufacturers have also declined with the reduced hours of darkness; while in other industries, there has also been a shortening of demand. The colliery proprietors have, in fine, found that manufacturers can, if they are resolved to be firm, place the coal sellers in an ugly position, and affect their anticipated financial results. There is such a thing as the price of coal being so high that, with other heavy expenses still on the upward scale, manufacturers in some industries find it an economic advantage to restrict their output, and so curtail their financial outgoings. One of the market reporters in the "Iron and Coal Trades Review" recognizes the danger. He says: "Coal owners are having "the best of it now; and consumers are calling out loudly "about the abnormally high prices that are being demanded "by the sellers. *They are certainly a good deal out of propor-* "*tion with the figures that the consumers can realize for their* "*produce.*" This shows the direction from which will come the pressure that will assist coal owners to their senses, and to the retracing of their steps from the unwarrantable lengths to which they have gone.

There is not the same amount of boasting now that we had a few weeks ago regarding the justification of home influences. It is the foreign buyer who, we are now assured, is setting and maintaining a high level of price for home needs. The same frank reporter from whom quotation has just been made says that, "in a great measure, the high "prices are due to the extraordinarily good demand from "abroad for Durham coal and coke; and, as the foreigner "will pay the heavy prices that are quoted, naturally the "colliery people sell to those who will give them the best "rates." This is the answer to those who, from the camp of the coal interests, have been attempting, in the Daily Press, to take the edge off the protests that have been made in high places in the gas industry against the removal of the revenue-producing coal tax, and which removal has not in the slightest degree benefited foreign buyers, but has taken from this country a productive source of income. It has been asserted that the infliction of the tax was not, from the national point of view, an economic benefit—that through it whole villages have been put into a bankrupt condition, and that it has meant starvation for families and for the much oppressed village shopkeeper. The Board of Trade returns tell a different tale. They show that coal exports, instead of diminishing, have increased during the years that the tax was in operation, and that more coal was raised and carried. This condition, and the willingness of the foreign buyers to now pay extortionate rates for coal which put into the shade those paid during the run of the tax, and their eagerness to buy from this country, enable us to dismiss the answer to the protest from the gas industry as brainless and false. It is this demand from foreign countries, and the further application of the miners for a 5 per cent. advance (which has not yet been finally adjudicated upon by the Conciliation Board), that are being utilized—slender though they be—as props for the maintenance of current quotations.

With regard to gas-coal prices, the colliery owners have, up to the present, thought better of their rumoured intention to immediately push contract prices still higher. For prompt delivery, there have been small pence concessions from contract prices. Regarding those for Durham coals, at the end of last week, reported quotations stood at Middlesbrough at 12s. 6d. per ton f.o.b., and 12s. for seconds. But coal was not being so freely bought as during the preceding weeks at those prices. From Sunderland, it was reported that 13s. 3d. to 13s. 6d. were the figures that were being realized f.o.b. From Newcastle, 12s. 9d. f.o.b. was quoted. An easier feeling on the market was reported from Lancashire; but owners, it was stated, showed no signs of abating their demands. From Yorkshire came the intelligence that the colliery owners had no difficulty in disposing of their output at current rates, and were asking 10s. to 10s. 6d. per ton for screened coals, 8s. 6d. to 9s. for unscreened, and 8s. to 9s. for nuts. Undertakings in the Eastern Counties were reported to be doing a brisk business with Nottinghamshire sellers, at prices from 8s. 9d. to 9s. 3d., and for seconds at 7s. 6d. to 8s.

This summarizes the position, so far as it can be stated from available information; but the indications are that the pressure has passed that was first given out as the reason for the recent single big jump upwards from the prices being paid under current gas-coal contracts. Coal owners are, however, apparently trying to sit firmly on prices somewhere about those mentioned above.

London under New Management.

After the Borough Councils, the London County Council. At the beginning of last week, the ratepayers of the Metropolis awakened to the fact that at length they had effectually freed themselves from the thraldom that threatened to sap their vitality. The past apathy of the electorate has aided the Progressives and Socialists in their self-satisfying task of imposing the burdens of excess and mismanagement on the ratepayers. But the pace has been too fast; and the ratepayers have at length turned upon the maladministrators. They discovered that the so-called Progressives, instead of confining themselves to the efficient government of the purely public affairs of the Metropolis, were paying greater attention to giving impetus to the ball that the extremists had set rolling towards collectivism and communism. Thus it came about that towards the end of last year, the ratepayers effectively subjugated the Progressives and Socialists of the Borough Councils; and now they have put a finish on the work by exactly reversing the position of the parties on the London County Council. The new masters of the situation are pledged to produce economy in future by bringing the influence of moderation and efficiency to bear upon the immoderation of the past, and to restrain with a no uncertain hand the further monopolizing of powers over enterprise, for the management of which, both by constitution and experience, public bodies are disqualified. The old County Council were very conceited as to their self-sufficiency. This would have been merely humorous if momentous issues had not hung upon the decrees of that conceit. Results told a different tale as to sufficiency; but they carried no warning, and produced no sacrifice of a policy that yielded the results. Every fresh responsibility that was undertaken inured to some loss of efficiency throughout the work of the Council, to the further accumulation of debt, and to the necessity for increasing rates and assessments to satisfy financial obligations. The new Council have entered into a heritage of financial muddle, both extensive and ponderous; and it will involve time, labour, and much anxiety to make any impression upon it. The people of London ought to be very thankful to those who have undertaken the task, and who have given the guarantee that the old policy of cumulative obligation and debt shall be reduced to the efficient minimum. It is some satisfaction to be assured that the weight of the burden is now approximately known, and that, even if there cannot be any immediate descent, there will be no ascent due to future policy, whatever old commitments may bring forth. The Municipal Reformers (who have now a majority equal to that of the old Progressive-Socialist majority of the Council) must, in pursuance of their policy, drop the Electricity Supply Bill of their predecessors, which proposed the expenditure of many millions on an experiment

for which no trace of possible success could be found. The verdict of the polls was unmistakable; and we have now to look forward to the incremental results of the supersession of the impracticable by the practical, and blundering and irrationality by judicious management. The influence of this will without doubt spread throughout the country.

An Electrical Coup d'État.

PARIS has furnished, with dramatic swiftness and effects, illustration of a fresh trouble to add to the already long roll of difficulties that beset constancy of electricity supply. In all places where an electricity service exists, between the generating-station and the carbons of the arc lamps, the filaments of the incandescent lamps, and the work expected of the electrical motor, the causes of interruption of supply are many and, as their repetition confirms, incorrigible. Therefore those who supply and those who use are always living in the unblest state of uncertainty. But mechanical and other derangements are not, as a rule, so sweeping in their results as when the whole of the electrical employees of a city or town league themselves, and, by concerted arrangement, simultaneously leave their work, with a view to enforcing their demands. That is precisely what happened in Paris on Friday. The city was unprepared for this; and it suffered hugely. Where gas had been disestablished, and where a temporary measure of relief could not be obtained by candles, oil-lamps, or torches, there darkness reigned. It was a new experience for the Parisians; and the Parisians, as is their wont, rejoiced over the novelty until it was worn away by increasing inconvenience. And the inconvenience was not long in being sorely felt. The dismal lights of oil-lamps and flickering candles were unequal in all cases to acting as deputies for electricity. Not only were streets and private houses deprived of illumination, but popular restaurants and cafés could not successfully conduct their business, music halls and threatres had to be closed, in offices and shops business had to be suspended, industrial and other concerns were suddenly brought to a standstill through the cessation of the energy required to drive their motors, and newspapers could not be printed. The electrical employees had awakened to the knowledge of the despotic power that the circumstances of electrical generation and distribution place in their hands; and they used it to force compliance with their requirements. The argument is certainly sharp and disastrous that they can bring to bear upon their employers' contentions in any matter of dispute or unsatisfied demand. By one pre-arranged stroke, the production of steam is stayed, the electricity generating machinery is brought to a standstill, and no current flows. It will be more perturbing than ever to suppliers and users to know that such swift and injury-dealing potency reposes through circumstance in the hands of the men. No such power rests with the labour of the gas industry. Between gas production and the consumer is the bulwark afforded by the gasholder; and in times of extreme dissension storage has tided over the period required for the re-manning of the works. Now that the electrical employees of Paris have put their power to the test by disturbing the nocturnal amenities of the city and its business and industry, that power has not, it may be feared, been used for the last time. Other electrical workers will not be backward in taking a hint from Paris.

Pontefract Arbitration Award.

The award of the Umpire (Sir Hugh Owen) in the Pontefract arbitration, which was made known at the end of last week, informs the Corporation how much they will have to pay for the acquisition of the Gas Company's undertaking. During the hearing last month, Mr. Forbes Lankester, K.C., for the Company, claimed 28·57 years' purchase, with the addition of 10 per cent. for compulsory purchase; the total being £89,016. Mr. W. A. Valon put in a valuation bearing out this figure; while Mr. H. E. Jones's total was very nearly the same—£88,781—and Mr. Henry Tobey also expressed agreement with the claim. For the Corporation, Mr. Wedderburn, K.C., called Mr. E. H. Stevenson, who said that he regarded £60,438 as a fair price to be awarded. He included nothing for compulsory purchase; and his valuation was worked out on a 4½ per cent. basis, as against the 3½ per cent. basis to which the Company's advisers urged that shareholders were entitled. This view was supported by Mr. John Wilkinson. One difference between the parties on which Mr. Wedderburn appeared to lay much stress when replying on the case, was the claim made by the Company in respect to loan capital. The whole of the loan capital authorized (£8000) was convertible into share capital bearing interest at not more than 5 per cent.; and it was maintained for the Company that it would be fair to regard 5 per cent. on this £8000 as profits which might be divided by the Company, beyond the maximum dividends on the share capital already raised. Mr. Lankester argued that if the right to convert the money borrowed was a valuable asset, then it ought to be paid for; while Mr. Wedderburn said that such a claim was "entirely new to him"—and "a strange and novel plan"—though he admitted that it had apparently been made in at any rate two other cases. Altogether, therefore, there was a pretty wide difference between the parties; and by the award of £69,600, the Corporation will have to pay about £9000 more than they said was the value of the undertaking, while the Company will receive some £19,400 less than they claimed to be entitled to.

The Distribution of Carburetted Water Gas.

Inasmuch as they have now got a definite answer, is it too much to hope that the agitators on the Liverpool Corporation who have been periodically directing their energies to securing the control of the distribution of water gas in admixture with coal gas will now allow the matter to subside? Nothing has arisen since the report of the Home Office Committee on the subject to justify Parliament in moving further in the matter; and the Liverpool Corporation have now been told so. The authorities at Westminster, we believe, have been well assured and persuaded that it is not the distribution of a percentage of water gas in the total supply, but, for the most part, gross carelessness and negligence, together with intentional self-destruction, that is the cause of occasional loss of life through gas poisoning or asphyxiation. The Liverpool Corporation, but no other authority, have been bestirring themselves for years in trying to induce legislation to control the supply of what they are pleased to call (so as to incite popular encouragement and support) "poisonous gas." Towards the close of last year, they endeavoured to get the Local Government Board to receive a deputation on the subject, said some nasty things in their own Council Chamber about carburetted water gas, and wrangled a little among themselves as to who should form the deputation. Their endeavours and words were wasted; for the Local Government Board politely informed the Corporation that the matter was not one for them but for the Board of Trade. This transference to another department has had no better success for the aspirations of the Liverpool Corporation. In the House of Commons, Mr. Harmood Banner, representing the Everton division of Liverpool, has questioned Mr. Lloyd-George on the subject; and the right hon. gentleman has told his interrogator that he has no intention at present to carry into effect the recommendations of the Departmental Committee. This is another way of saying that nothing fresh has been advanced to warrant him moving in the matter.

End of the Opposition to the Falmouth Gas Bill.

The decision of the Falmouth Town Council last week removes one more Gas Bill from the list of possibly contentious Private Bills in the present session. A few members of the Corporation appear to have been disappointed that the opportunity for a fight should have been allowed to pass; but the ratepayers as a whole are not likely to share this feeling. Little, indeed, was left to fight about after the concessions made by the Directors. The only point really at issue was whether a clause should be inserted in the Bill empowering the Corporation to purchase the undertaking. A few councillors with Progressive ideas were exceedingly anxious that this power of purchase should be vested in the Council, though there does not appear to have been any general expectation that it would or could be exercised. Some fifteen or twenty years ago the Falmouth Corporation succeeded in getting a clause of this kind incorporated in an Act promoted by the Company. It gave them the option of buying the works at any time within ten years; but though there was endless talk about it, the powers were ultimately allowed to lapse without being exercised. In the present case, the Engineers consulted by the Corporation have advised them that they could not expect a renewal of an option extending over anything like ten years, and that the utmost which Parliament was likely to concede

would be a clause authorizing the Corporation to acquire the gas undertaking within a year of the passing of the Act. They appear also to have informed the Corporation that such power was likely to be accompanied by a condition that the purchase of the works must be followed by their reconstruction on a new site. As the Corporation were anxious to force the Company to agree to the removal of the works from the centre of the town to the suburbs, they could not have resisted with good grace any condition of this kind which Parliament might have imposed on them. However desirable the removal of the works may be, the majority of the Council wisely concluded it was impossible for the Corporation to undertake the acquisition and transplanting of the undertaking in the immediate future; and the Bill will therefore go through with such concessions as the Directors have made. These are of a substantial character in the financial sense; and the gas consumers are likely to be better off under the Company's continued administration than they could possibly be under the Corporation if they had had to incur anything like the capital obligations which some members anticipated.

Another Inquiry at Nottingham.

Once more the "gas agitation" is claiming attention at Nottingham—this time, of course, in connection with the public inquiry which it was agreed some weeks ago should be held. The steps which led up to this decision will no doubt still be fresh in the minds of our readers; and there is therefore no need to recapitulate them. The inquiry was to be held by a Committee consisting of five members of the Council; and it was to be in connection with the working of the gas undertaking during the past five years. Subsequently, the Committee were chosen, with the Mayor at their head; and, as is reported to-day in the "Miscellaneous News" columns, the first meeting was held last Thursday. Strange to say, however (or is it strange, after all, perhaps—seeing how long drawn-out the agitation has been?), there was manifested but a very slight amount of general interest in the proceedings; the public, we are told, being represented by only about "a couple of dozen" at the outside. This did not, of course, make any difference to the proceedings of the Committee, who sat for three hours, and then adjourned, with the announcement that they would meet on two days this week. Only two witnesses were called on Thursday. Mr. F. B. Harris, the Assistant Solicitor to the Corporation, gave an historical survey of the undertaking (owing to the absence through ill-health of Sir Samuel Johnson, the Town Clerk); and Mr. J. H. Brown followed with some particulars regarding the plant. The inquiry is to be taken under four distinct heads: (1) Plant and distribution; (2) quality of gas; (3) method of obtaining contracts for plant, goods, and materials; (4) price of gas. This is a fairly comprehensive programme; and it will—seeing that each branch is to be taken separately—doubtless entail calling the same witnesses over and over again, as the different questions are taken in hand. By this means, the inquiry will be rendered more easy to follow, besides being simpler to undertake, than if it had not been so divided up. Whatever may be the outcome, there does not seem to be any reason to doubt, from the first day's proceedings, that the Committee are bent upon going as fully as possible into the matter. But how far they will be successful in their endeavours to clear up whatever mystery there may be, cannot depend entirely upon themselves; and in this connection it is significant that, in spite of advertisements inviting those who desire to give evidence to communicate with the Committee, the response has been of a most discouraging nature. No intimation has been received from the three members of the Council who gave evidence at the last inquiry as to whether they will come forward again; but perhaps it is as yet too early to altogether abandon the idea that these gentlemen may eventually determine to give public expression to their views.

Unfortunate Position of the Mond Gas Company.

The report of the Directors of the South Staffordshire Mond Gas Company for the year to December last (which was noticed in last week's issue of the "JOURNAL," p. 630), must have proved anything but satisfactory reading to the shareholders, inasmuch as not only was there no dividend forthcoming, but the balance on revenue account was very much on the wrong side. Manufacturers are, it seems, still shy about taking advantage of favours which the Company are only too anxious to confer upon them, with the result that the loss on revenue account for the twelve months amounted to the disconcerting total of £13,677. And this, be it marked, followed a debit balance of practically £9000 on the previous year's operations. At this rate of "progression," matters would seem to resolve themselves merely into the question of how long the Company can afford to continue working. But, in fairness, it must be borne in mind that the Directors are engaged in an uphill task; for, even supposing that all their claims regarding the economy of their process can be substantiated in practical working, it is needful to convince prospective customers of the fact—which must take time. That the progress made in this direction has been "grievously disappointing" the Chairman himself admitted to the shareholders—a feeling which, it is perfectly safe to predict, they fully shared. In spite of every effort, the output, we are told, has been little less than half the capacity of the plant; and of this, apparently, the South Staffordshire Mines Drainage Commissioners still take a portion—at a "special" price. It will be remembered that the previous year it was stated that these Commissioners were "not being supplied at a profit;" and perhaps the same might have been said of the past twelve months, for the Chairman remarked that "if all the gas had been sold at the average price received for that supplied to ordinary customers, their income would have been increased by nearly £11,000, and their loss reduced to about £4000." Figures supplied of a case in which a steam-engine had been replaced by one driven by Mond gas seemed satisfactory enough; and the Company themselves have erected furnaces at their own works to demonstrate their ability to do what they claim. But in spite of all this, as the Chairman remarked, "the manufacturers of the district have not shown that willingness to avail themselves of the advantages and economies that could be given them which would have been expected from business men." The shareholders will fervently hope that in the future these gentlemen will show a greater readiness to use Mond gas than they have done in the past.

The London and Southern District Junior Gas Association will hold a meeting at the Cripplegate Institute, E C., on Wednesday, the 20th inst., when a paper will be read by Mr. E. W. Eldred, entitled "Public Lighting."

Gas Companies (Removal of Sulphur Restrictions) Bill.—As recorded in our "Parliamentary Intelligence," this Bill, which has been promoted jointly by the Bath, Blyth and Cowpen, Eastbourne, Scarborough, Tynemouth, West Ham, and Weymouth Gas Companies, has been read a second time and committed. The Committee of Selection had the Bill before them last Wednesday; and, there being no petitions against it, it was referred to the Committee on Unopposed Bills.

Association of Water-Works Engineers.—We have received the "Transactions" of the Society for the past year. The contents consist mainly of the papers read at the summer and winter meetings, held at Scarborough and in London respectively, with the discussions thereon. The proceedings on these occasions were fully reported in our columns at the time. The papers as now given are well illustrated. The other matter comprises the address of the President for the year, Mr. W. Millhouse, Assoc. M.Inst.C.E., the Water Engineer to the Scarborough Corporation (whose portrait is given as a frontispiece), lists of the Council, Past-Presidents, and officers, and a useful subject-matter index to the eleven volumes of "Transactions" which have appeared. The book has been brought out under the editorship of Mr. Percy Griffith, M.Inst.C.E., F.G.S., the Secretary of the Association.

Testing Gas-Meters.—It may be remembered that in the "JOURNAL" for the 27th of November last we published a report presented to the London County Council by the Public Control Committee on the subject of the testing of gas-meters. The Committee directed attention to certain defects of the Sale of Gas Act, 1859 (one being the absence of provision for testing the indices), and recommended that the attention of the Board of Trade should be directed to these defects, and that they should be asked to introduce this session a Bill not only to amend them, but to introduce fresh legislation on the following points: The reduction of the range of error permitted in meters to 1 per cent.; the provision of an effective method of stamping meters, with a view to the prevention of fraud; the power to a consumer to have a meter tested whether it be stamped or not; the revision of fees for testing *in situ*, and to cover the additional cost of testing the index; the simplification of the procedure in cases of appeal; and the periodical re-verification of meters. The Institution of Gas Engineers have had this matter under consideration; and the Parliamentary Committee have had the report above referred to reprinted, and are now circulating it among the members with a request to be favoured with an expression of any views they may hold with regard to the proposals contained therein.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 701.)

THE Stock Exchange has had a most disappointing week. It opened well under the beneficent influence of the London County Council elections, though reflection reminded that the new body was inheriting the commitments of the old, and that no great economies are yet possible. But a strong wave of depression set in early from that prolific centre of disturbance, New York, where an almost unexampled struggle between the bulls and the bears raged in the Railway Market—the latter having the best of it so far. This produced a general feeling of uneasiness and apprehension over here, which affected more or less pretty well every department, from Consols and the choicest gilt-edged stocks downward. These last were also at some disadvantage, in view of approaching new issues. Altogether, it was a bad week all round right up to the close. In the Money Market, the opening tendency was easy under the influence of conditions which ruled at the close of the preceding week; but it gradually hardened, and closed firm. Discount rates were firm all along. In the Gas Market, there was a marked improvement in business so far as activity was concerned, though that seemed to be falling off somewhat towards the end. But the market bore up very well against the depressing influences around it, and there was hardly any change in values—only two quotations making a slight retrograde movement. In Gaslight and Coke issues, the ordinary effected a slight improvement on the figures it had stuck to so closely for some weeks past; and still maintaining 95¾ as its minimum, it touched 97 more than once as its maximum. More transactions than have been the average of late were marked in the secured issues. Dealings in the maximum were recorded at from 87½ to 89; in the preference at from 106 special to 107; and in the debenture at 84½ and 84¾. There was an increase of business in South Metropolitan; but the tendency was rather weaker. Transactions ranged from 125 to 123—a fall of 1 in the quotation. The debenture was done at from 84½ to 85½. Hardly anything was doing in Commercials. One deal in the 4 per cent. was marked at 109¾ (after some small parcels had been let go free at 107½ for the 4 per cent.), 105½ for the 3½ per cent., and 83 for the debenture. The Suburban and Provincial group was as quiet as usual, or more so. Brentford old was done at 253, a small amount of Tottenham debenture at 101 free, West Ham at from 103 to 104, and ditto preference at 122½. In the Continental Companies, business was moderate. Imperial changed hands at from 179 to 180½, Union at from 122½ to 123½, ditto preference at 142, and European fully-paid at 24½ and 24¾. Among the undertakings of the remoter world, Bombay was done at 7, Primitiva at 7⅞, ditto preference at from 5⅛ to 5 3/16, River Plate at from 12½ to 12⅝, ditto debenture at 96¼ and 97, Monte Video at 11⅝, and San Paulo at 13¼.

The closing prices are shown in our list on p. 701.

ELECTRIC LIGHTING MEMORANDA.

A Pessimist on the New Metallic Filament Lamps—Their Development and Success said to Spell Disaster for the Electrical Industry—Drastic Measures Necessary—Suspicious Fires—Fuses not a Certain Protection—Unfortunate Failure - Fruitless Expenditure.

THE last two weeks, electrical statistics and power supply have monopolized the space that could be spared for the "Memoranda." This week, we can return to general topics. Since attention was last drawn to the subject of metallic filament lamps, the "Electrical Times" has created mild excitement by publishing a couple of articles in which there is a great deal of solid truth about metallic filament lamps, with a plentiful interlarding of prophecy and warning. The line of argument, however, was somewhat overdone, and the dressing here and there a bit too sensational. The articles are written under the pseudonym of "A Lamp Maker." We do not know positively, but it seems to us that if "the voice is Jacob's voice, the hands are the hands of Esau." However that may be, it is positively stated that the metallic filament lamp has come to stay. Of this there can be no doubt. But the writer goes on with extreme vigour to prove that, so far as vision permits a survey to be made of the situation, the staying is going to be on a limited scale—that is to say, in this country. He says:

> The voltages at which at present the lamps, with one exception, can be run are comparatively low; and it would seem that many difficulties have yet to be overcome before they can be made suitable for voltages between 200 and 250. For one thing, the filaments appear to be as fine a gauge as seems possible of attainment, unless the methods of producing them are considerably improved. A difficulty consequently exists in raising the resistance of the filament sufficiently high to enable low candle-power lamps of this type to be made for use on ordinary circuits. Consequently, we find that, while several forms of metallic filament lamps are a commercial possibilty for 100 volts, the question remains as to whether this type of lamp can be made for equally low or, preferably, lower candle-power at the ordinary supply station voltages of 200 or more.

The lamps may find use in isolated places, and in street lighting on 200 volts, where there is no objection to using lamps in series. But we come to this, regarding the question from a general standpoint: If the lamps cannot be made for high voltages and low candle powers, they "will not come into startling prominence." Then, again, the difficulty in obtaining the best lighting effect downward, without adding complications in the shape of special shades or reflectors, and the fragility of the filament due to the fact that it is run at a temperature not far from its melting-point, will militate against it.

From all of which, it would seem that hope of surmounting the difficulties that beset the development of a "1 watt per candle" metallic filament lamp complying with all requirements is not strong within the electrical breast. The physical obstructions to progress to the desirable end for the consumers are many and obdurate. It is, however, obvious that there are not a few among electricians who ardently hope that the difficulties will continue to assert themselves. And why? "A Lamp Maker" replies:

> The advent of the metallic filament lamp spells disaster, sharp, sudden, and complete to our electric supply authorities, unless innovations are brought promptly into being to cope with the danger. . . . Increased use will balance decreased specific consumption? I am afraid not. The metallic filament lamp will be in extensive practical use before station engineers have grasped its import, and decreased current consumption will be confronting us long before the use of the light becomes so general as is anticipated.

That is an awful outlook; and, revelling in his apparently congenial task, the writer piles on the agony with a computation that, to bring about a balance of consumption, nine metallic filament lamps will have to be connected in place of every two at present on the mains. We turn aside from this dismal picture for the moment to a note in a subsequent issue of the "Electrical Times" in which it is stated that "one large building is saving £1000 per annum by using lamps of this type, and we have heard of station engineers who are taking steps to counteract these effects. In one case a four-light fitting, wired and fixed complete, representing a total candle power of 200, is to be supplied for £4 10s. per annum for 800 hours' use, and 1¼d. per hour for every hour exceeding 800." In other words, to preserve consumption, something in the nature of a little fraud is being practised on the consumer, to divert from him the purse advantage in relation to consumption, and give him an amount of light that in most cases he will not need. This is interesting; but it shows how strong is the instinct of self-preservation among some electricians, and how utterly repugnant to them is any gain of economy to the consumer. We must admit that in most cases lean returns will not allow great generosity.

But returning to the article, although radical innovations may not be brought promptly into being, the writer himself (though he does not appear to realize it) advances all the argument necessary to show that "disaster" will not come upon the electrical industry sharply or suddenly. The metallic filament lamp that possesses the virtue of such elasticity as the carbon filament lamp, has not yet arrived; and any change would be gradual, for consumers are not in the habit of scrapping before they are obliged, nor do they rush to pay heavier prices for lamps than those to which they have been accustomed. It was in the early nineties before the satisfactory incandescent gas-mantle came to hand; and still there are consumers who are realizing 2 candles per cubic foot of gas by flat-flame burners, whereas they could obtain 18 and more candles per cubic foot by the adoption of the modern scientific means of using gas, and thus save considerably on their gas bills. But the parallel of the incandescent gas-mantle is only part of the story. The electricity industry's sources of revenue have no comparison with the varied sources of the gas industry—such as cooking-stoves and gas-fires at lighting prices for gas, the slot gas-meter business (which has surpassed anything that the wildest flights of imagination had forecast), and the residuals business. Therefore, if the station engineer would save himself, "A Lamp Maker" advises him to do something drastic. What he regards as doing something drastic appears to be the use of overhead wiring for extensions, the adoption of something that looks much like jerry house wiring, the abolition of meters, charges on the basis of per lamp per annum, and, in fact, everything else that can be done to make the price of light so low "as to prevent gas competing on anything like terms of equality." It is a revolution that is advocated. But stay, there are a couple of other channels which he thinks promise hopefully. Motive power and heating must be popularized, at low prices. We have been labouring under the impression that the popularizing of electricity in these directions, and by the means suggested, has been going on for quite a long time. Now we read:

> Radiators are hardly known, and, where known, can hardly be used on account of either the cost of current or of special wiring. It is silly to speak of radiators costing about 1d. per hour to burn, when we know perfectly well that special wires and plugs have to be fixed, and a separate meter coupled up, before they can be used. If bought and fixed to the nearest circuit, as a man would fix a gas-stove to the nearest service-pipe, the cost of burning would be about 4d. per hour, or whatever the lighting charge was.

"A Lamp Maker's" method is to pull down the average revenue per unit; but he has overlooked what that pulling down process has done for some of the London Electricity Companies. He should ask the shareholders for information about the successive droopings of their dividends. But we come to the end of the articles, the cloak of pessimism is thrown off, and radiant optimism is found. It, however, all depends on the acceptance of the ways and means set forth. Then—oh! the glory of it—it will be

ound that "the very inventions which have threatened to destroy the business of electric supply have really ushered in the Golden Age of Electricity." The writer frequently slips into postulation, as is natural in dealing with the unknown; but in one place there is a bad slip, where he says that, through its average life, the gas mantle "is really not so greatly superior to the best form of fishtail burner." But in view of the remainder of his articles, we forgive the writer the untruth, or perhaps politeness requires from us that we shall still designate it a "slip."

Attention is once more called to the relationship between fires and electric wires. Dr. Waldo (City Coroner) and others have been talking over the matter in connection with the Wood Street fire in February, when damage—estimated at £80,000—was caused. This is the biggest fire that has occurred in the City since the Barbican outbreak in May, 1902. There have been some decent sized ones in the interim; and Dr. Waldo tells us that insurance rates for such warehouses as those in Wood Street have, consequently, gone up tremendously. The first information about the Wood Street fire in February last was that a Mr. Baker noticed "a dull red light" through a frosted glass door on the second floor of No. 12, Wood Street. But a porter declared that he left the office in question in perfect order, a few minutes after his employer had quitted it; and he also mentioned that a few years ago there was a "short-circuit fire, which was caused, so it was suggested, by a live wire touching the telephone wire during the installation of an electric radiator." This brought from Dr. Waldo the statement that he had heard, and had known, of some very suspicious cases in which electric wires were concerned. There seemed no doubt they constituted a danger of a kind; but it appeared that everything possible was being done to minimize the risk. Then followed this little conversation between a juror and Lieut. Sladen, the Divisional Officer of the London Fire Brigade at Euston: A Juror: "Do you find more fires now than before due to electric wires?" Lieut. Sladen: "Yes; five years ago there were only twenty a year, whereas last year we had over 150." A Juror: "And that is due to the increase in electric lighting?" Lieut. Sladen: "Yes, certainly. I recommend that the wires be carried through metal tubes." While the jury returned a verdict to the effect that the fire was caused by some means unknown, they also recommended that all electric wires should be encased in tubes. Touching this question of fires, there is a word to say about the prevalent idea that fuses are the great safeguard against fires occurring through any fault in an electric installation. This is not right; and "Electricity and Electrical Engineering" owns up to it. Within a certain range of contingencies, fuses are certainly safeguards, and obviously indispensable; for instance, against the overloading of leads and against short-circuits. But, our contemporary candidly says, they are not a protection against all chances of fire. Some of the most insidious of faults can still do damage and yet, possibly, not blow the fuse, either at all or too late. These are in regard to bad connections. And one of the most usual places where such faults occur, especially where the wiring and fitting have been carried out in a slipshod manner, is in connection with the switch-wires.

The electric light is no respecter of persons. It is, however, too bad that the light should make its best friends suffer. No one could work more incessantly in its interests than the Editor and staff of the "Electrical Review." But in the issue of that paper for March 1, we came across the following: "As we go to press with our last pages, our electric light has gradually faded away. First the Nernst ceased to glow, at 12.10; the carbon lamps maintained a feeble glimmer for half an hour longer, and then gave up the ghost. We are now writing by the light of a tallow candle, stuck on a cocoa tin. We thought the Charing Cross Company welcomed foggy days! Our neighbours on the City Company's mains are more fortunate." We can only express our deepest sympathy, and regret that such a bad choice of lights should have been made by our journalistic friends.

The story of the abortive electricity scheme for Sudbury, Suffolk, over which muddle supervened upon muddle, has been told in the "JOURNAL." The Ratepayers' Protection Association have lately issued a statement showing the details of the expenses incurred through this interference by misguided amateurs (misguided, as the issue of a legal case proved) in such a complicated and speculative business as electricity supply. The total amount of the expenses was £1225; and Mr. Hawtayne's professional services are entered at £500 out of that sum! Sudbury can ill-afford to spend £1225 without getting some return for it; but perhaps it is better to have spent £1225 without return than many thousands of pounds on a white elephant. Sudbury may prove—we hope it will—a salutary warning to other country towns.

Southern District Association.—We learn from the Hon. Secretary (Mr. A. F. Browne) that the annual meeting of the Southern District Association of Gas Engineers and Managers will be held on Thursday, the 21st inst., at the Hotel Cecil. In addition to the general business and the inaugural address of the President (Mr. H. W. Woodall, of Bournemouth), a proposition will be submitted for an alteration to Rule 22. At present this rule reads: "Each member of the Association shall be furnished annually by the Secretary with a copy of the regulations, and with a list of the names and residences of the members;" and the object of the motion is to omit the words "with a copy of the regulations and." At the conclusion of the meeting, the annual dinner will take place.

OBITUARY.

We regret to learn that Mr. CHARLES E. SANDERSON, who had been connected with the "American Gaslight Journal" since the beginning of 1870, and had for some years been its business manager, died at his residence in Brooklyn (N.Y.) on the 20th ult., in his 61st year.

Mr. EDWARD WARD, who had been 22 years in the service of the Salford Gas Committee, and who had risen to the position of foreman of the Regent Street and Albion Street works, recently died at the age of 69. His funeral was attended by Mr. W. W Woodward, the Chief Engineer, Mr. Hartley, the Assistant-Engineer, and other officials, besides a number of the workmen.

The death occurred recently of Mr. WILLIAM JAMES HARRIS, of Sittingbourne. Deceased, who was 73 years of age, had been Secretary of the Sittingbourne Gas Company and the Rainham Water Company, and he was the senior Coroner for Kent. He had passed 53 years of his life in the service of Sittingbourne; and there was scarcely a public authority or institution in which he was not directly or indirectly interested.

We regret to record the death on the 2nd inst., under painful circumstances, of Sir FREDERICK WIGAN, Bart., one of the Directors of the Cagliari Gas and Water Company, whose meeting is reported to-day. The deceased baronet came to town from East Sheen to vote in Southwark in the London County Council election; and while so engaged he was seized with sudden illness in Redcross Street, Borough Road. Assistance was promptly summoned, and he was conveyed to Guy's Hospital, where he died without recovering consciousness.

The death occurred recently of Mr. WILLIAM AUGUSTUS MITCHELL, who was known from 1880 to 1890 as the "Benzol King." He was the head of the firm of Messrs. W. C. Barnes and Co., of Hackney Wick, and was well known in the coal-tar products industry, especially in the departments of benzol and aniline. According to the "Chemical Trade Journal," he was son-in-law of Mr. W. C. Barnes, who was the first distiller of pure benzol, toluol, aniline, and toluidine, and also the first to make nitro-benzol and aniline on a large scale in this country. The late Mr. Mitchell was in his 62nd year; and he leaves a widow, four sons, and four daughters.

The death occurred recently of M. HENRI MOISSAN, the distinguished French Chemist. Born in Paris in 1852, he studied at the Museum of Natural History, and in 1879 was connected with the School of Pharmacy, where he became Professor of Toxicology in 1886 and of Mineral Chemistry in 1889. In 1900 he was appointed Professor of General Chemistry at the Sorbonne and also Director of the Institute of Applied Chemistry. One of the earliest achievements that brought him fame was the isolation of the element fluorine in the free state—a problem which had attracted the attention of many chemists before him, though with little success. He will be best remembered by our readers in connection with his investigations into the capabilities of the electric furnace, on which he published a book—"Le Four Electrique"—in 1897. By the aid of this furnace he succeeded in melting a great number of substances which had previously been regarded as infusible, and in reducing, with carbon, refractory oxides such as lime and silica to their elementary state. He was also able to prepare many new compounds, especially carbides, silicides, and borides, including calcium carbide, which was obtained almost simultaneously by him and by Willson in America in 1892. The success of these investigations led to the establishment of the acetylene lighting industry. Professor Moissan was well known in England.

THE LATE MR. WILLIAM SUGG.

The Funeral Ceremony.

A COMMON sorrow, affection, and regard caused a large congregation to assemble at the Church of the Ascension, Balham Hill, early last Tuesday afternoon, where was rendered the first part of the solemn rites attending the laying to final rest of the body of him whom we have all revered in life, and shall continue to revere though removed from our midst—William Sugg. The widow and children of the deceased and a large number of other near relatives were present. Represented in considerable numbers, too, were the staff and employees of the firm that had sprung from the intellectual gifts of the now departed head, for whom—the kind and generous master that he was—the staff and employees had deep-seated regard. One who could claim having been Mr. Sugg's contemporary in the hard work of the gas industry farther back in the years that are dead than any other person present at the church was Mr. G. C. Trewby; and appropriately there sat with Mr. Trewby one of the present-day chief officers of the Gaslight and Coke Company—Mr. H. Rayner the Secretary. The neighbouring great Gas Company were represented by Mr. Charles Carpenter and Mr. Frank Bush; and the Institution of Gas Engineers by their Secretary, Mr. Walter T. Dunn. No doubt various other organizations with which Mr. Sugg was identified had delegates present; but anyway (as will be seen) other bodies were represented later at the cemetery.

Clergy and choir, at the hour appointed, received the coffin (which was almost completely hidden by its wealth of floral tribute) and the chief mourners at the main door of the church. As the procession passed up the central aisle, the beautiful hymn was sung—

Let saints on earth in concert sing
With those whose work is done.

The words of the second line lingered, and thoughts rushed back over the long period of steadfast and successful work, carried from stage to stage with the times—the achievement of one day supplying the point from which to commence the next—by him whose voice was now still, whose brain and hand were now inactive. The service was a choral one; and throughout earnestness, sympathy, and sorrow mingled and pervaded the sacred place. The first part of the service ended, the *cortège* proceeded to Streatham Cemetery, Tooting; and there, again, were found many wishful to pay their last respects. At the graveside, the service continued. Near by stood Sir George Livesey—almost life-long friend of Mr. Sugg, and constant admirer of his genius. With the President of the Southern District Association of Gas Engineers and Managers, and likewise W.M. of the Evening Star Lodge (Mr. F. W. Cross), were the Secretary of the Association (Mr. A. F. Browne), and the Secretary of the Lodge (Mr. W. D. Child). At the conclusion of the service, after the family had departed, many peered down the grave with its evergreen decked walls. The bright name-plate on the coffin was visible; and it bore the inscription, "William Thomas Sugg, Died Feb. 28, 1907. Aged 74 years." It was a long life, well and actively spent. The talents bestowed fructified abundantly for the gas industry, and those whom the industry serves.

THE LATE MR. WILLIAM YOUNG.

The Funeral—Handsome Bequest to the Town of Peebles.

THE funeral of the late Mr. William Young took place at Peebles last Tuesday afternoon; and it was attended by a large gathering of friends of the deceased from far and near. Among those present were Sir Henry Ballantyne (Provost), and the Magistrates, Councillors, and Burgh Officials of Peebles, and the following Gas Managers: Messrs. W. R. Herring, of Edinburgh; A. Bell, sen., of Dalkeith; A. Bell, jun., of Peebles; A. Waddell, of Dunfermline; J. W. Napier, of Alloa; W. Brown, of Lasswade; S. Glover, of St. Helens; Levi Monk, of Lewes; and John Hammond, of Eastbourne. Among the general public were Mr. James Milne, of Messrs. James Milne and Son, Limited, and Messrs. G. T. Beilby, of Glasgow, J. Dennis and D. Brown, of Dalkeith, and J. Gordon Mason, S.S.C., Mr. Young's Law Agent. The coffin—a handsome oak one—was surmounted by rich floral tributes. Service was conducted, both in the house and at the grave, by the Rev. James Dewar, Baptist Minister in Peebles. As the *cortége* wound its way through the streets, the remains were respectfully saluted by the inhabitants of the burgh, among whom Mr. Young had spent the evening of his life. The obsequies were, in accordance with Scotch custom, of the simplest character.

Mr. Gordon Mason has intimated to the Provost of Peebles that Mr. Young has, by will dated Sept. 7, 1905, directed that (on the death of his son) the farm of Harehope, in the parish of Eddlestone, together with the stock, implements, &c., thereon, shall be conveyed to the Provost, Magistrates, and Town Council of Peebles, as Trustees, for the purpose of founding a sanatorium or hospital, to be called "The Harehope Sanatorium," for the treatment of persons suffering from phthisis. Inasmuch as the income or revenue to be derived from the farm and lands may not be sufficient for the immediate erection or maintenance of the sanatorium, the testator has conferred power on the Town Council to accumulate the revenue for such period as they may consider necessary to provide a capital sum sufficient to yield a suitable revenue. He has also directed that the conditions and regulations to be prescribed and adjusted by the Town Council for carrying out this trust shall contain provisions that the benefits of the sanatorium shall primarily, and as far as possible, be applied for the benefit of persons who may not be able to pay all or any part of the cost of residence and treatment therein, and that, in the case of selecting from persons who may apply for residence and treatment therein, and who may not be able to pay all or any part of the cost thereof, preference shall be given first to persons resident in the burgh, and secondly to those in the county of Peebles. In his will, Mr. Young has explained that it occurred to him, while resident at Harehope, and experiencing the benefits to be derived therefrom, that from its equable temperature, due to its southern exposure, dry subsoil, and sheltered position, it would be a most suitable situation for a sanatorium or hospital for the treatment of persons suffering from tuberculosis, consumption, or other disease or diseases of the lungs, and that he had observed and felt deeply sorry for those suffering from such diseases, who might have been greatly relieved or cured by residence and treatment in such a sanatorium, but who could not pay for it.

The estate of Harehope is beautifully situated on the road from Lyne to Eddlestone. The present yearly rental is £300; and the value of the stock, &c., included in the bequest, is estimated at £2000. Needless to say, the intimation of the bequest has given rise to feelings of the highest gratification in the town and district.

"TIT-BITS" FOR GAS ENGINEERS.*

THE new edition of Mr. O'Connor's "Pocket-Book," which lies before us, presents a strange medley, culled from many and varied sources—some acknowledged, some unacknowledged. If only its would-be user should be competent to sift the wheat from the chaff, and will not object to engaging in the sifting process, he may be glad to have the book beside him in place of one or more less comprehensive or pretentious, but more uniformly trustworthy, works of reference. The general form and appearance of the pocket-book are in its favour, and the first 140 odd pages of general mathematical tables are (so far as we have applied checks) reliable. Square roots and cube roots of the numbers from 1 to 1000, however, are stated to the third place of decimals, and in a great many instances the last figure is not the nearest to the correct value. For instance, the cube root of 89 is given as 4·461, whereas it should be 4·465. The corresponding tables in two well-known pocket-books which we have looked up for the sake of comparison are free from these errors. The tables of logarithms to six places also occasionally show small errors.

Tables of thermal data crop up at intervals in this and subsequent parts of the book, and there is a great deal of duplication and, we are sorry to say, contradiction. For instance, on page 98, the specific heat of phosphorus is given as 0·288; on page 336, as 0·2503. Zinc is ascribed four different melting points on as many different pages. The boiling point of "mercury" differs by 14° Fahr. from that of "quicksilver" in the same table! The specific heats of gases as given are curious in several instances; but it will suffice to point out that that of "marsh gas" is identical with that of "light carburetted hydrogen" at "equal pressure," but widely different at "equal volume." We have now, however, said enough to indicate that when the purely mathematical tables are passed, Mr. O'Connor's book is not reliable nor even consistent with itself.

The later pages, dealing with the construction of gas-works, and the manufacture of gas, largely comprise disjointed paragraphs of information of varied utility and trustworthiness. Among the tit-bits here presented may be quoted the following: "Test for naphthalene.—Redden liquor with nitric acid supersaturated with muriatic acid. If naphthalene be present, it will tinge a piece of firwood a deep purple." "One per cent. air has no effect on illuminating power." "One per cent. of common air diminishes the illuminating power 6 per cent." "Calcic carbide is liquefied at 32° Fahr. by a pressure of 21½ atmospheres."

The pocket-book (which contains a comprehensive index) concludes with a reprint of the regulations made for testing gas in the Metropolis, as revised to August last. Looking through the volume, one notices that Mr. O'Connor names his authorities in many cases. To some he prefixes "Mr.;" others are without it; while Sir George Livesey appears several times as "Mr."

* "The Gas Engineer's Pocket-Book: Comprising Tables, Notes, and Memoranda relating to the Manufacture, Distribution, and Use of Coal Gas and the Construction of Gas-Works." By Henry O'Connor, F.R.S.Edin., Assoc.M.Inst.C.E., Past President of the Society of Engineers. Third Edition, Revised. London: Crosby Lockwood and Son; 1907.

THE ELECTRICAL TRADES' DIRECTORY.

WE have received from the "Electrician" Printing and Publishing Company, Limited, of Salisbury Court, Fleet Street, the "Electrical Trades' Directory and Handbook"—familiarly known as the "Big Blue Book"—for the current year. This is the 25th year of publication, and every possible effort has been made to bring the contents of the present edition close up to date. The volume includes complete notes of the year's progress in electric traction, electric power, and the applications of electric driving to industrial works. The progress made in electric lamp improvements, &c., is also set out; and a complete summary is given of the parliamentary work in the past session, so far as legislation has affected the electrical industry. The law of electric lighting, power, and traction is fully dealt with; and in a digest specially prepared by Mr. A. C. Curtis-Hayward, A.I.E.E., Solicitor, the principal legal decisions of the High Courts in 1906 affecting the electrical industry are fully considered. The subjects of patent law and expiring patents, of rules for the installation of electric light, power, and traction in this country, the fire risk rules of all the leading Fire Offices, as well as those which govern electrical installations in the United States, Germany, France, Switzerland, and other Continental countries, and also in the British Colonies, are included in the volume. Full financial details relating to electrical joint-stock enterprise, and information referring to the financial side of every branch of the industry, are to be found, including a Directory of Directors of Electrical Companies, particulars of the capital authorized and issued, the last dividends paid, the latest Stock Exchange quotations, the principal officials, &c. The "Directory Division" contains the name and address of every person engaged in the electrical profession and industry throughout the United Kingdom, his telephone number and telegraphic address; and a separate list of telegraphic addresses (alphabetically arranged) is included. There is also a "Biographical Division," giving interesting sketches of the careers

of the leaders of electrical engineering enterprise at home and abroad; and a complete obituary for 1906. The book contains a graphic survey of the engineering and electrical equipment of all the electricity supply, electric power, and electric traction undertakings of the kingdom in the form of five compact tables, the details furnished being very comprehensive. One of these tables is devoted to Colonial undertakings of the same character. There are in all more than 2000 pages in the "Directory," and certainly there is no slackening of the Editor's efforts to keep up the high reputation of the work, the price of which is 15s. net, exclusive of postage.

EXPERIMENTS WITH INCLINED RETORTS AT GUILDFORD.

Some Further Results.

When Mr. G. R. Love read, at the last November meeting of the Southern District Association of Gas Engineers and Managers, his interesting paper on the experiments at Guildford with vertical and inclined retorts, there was an eager desire on the part of the members to know more, and an equally earnest desire on the part of Mr. Love to continue the trials if opportunity allowed, so as to fortify the opinion he had formed as to being on the right track for securing a further increment of productive advantage from the carbonization of coal. Opportunity has favoured; and the experiments have been prosecuted. It will be remembered that, in these trials, Mr. Love set out from the horizontal retort, and went at once to the vertical, but he eventually retraced his steps, and found himself exploring carbonization by means of retorts set at an angle of 45°, and fed continuously by a series of vanes from an overhead hopper. The gases were led off at the upper or charging end of the retorts; and the coke was discharged at intervals of one-and-a-half hours at the lower end. Owing to the short length of the retorts (only 10 feet), the coke, under this system of working, contained a large percentage of breeze, due to want of compression.

That is, generally speaking, the point at which we had arrived in Mr. Love's experiments as recounted (with the results) in his paper. From this stage, Mr. Love began charging the retorts—a bed of eights, of length and angle mentioned—full at one operation; and the first satisfactory result was that the trouble with the coke was found to be overcome by this mode of working. Therefore, for a number of weeks, the continuous arrangement of charging has been discarded; and the filling of the retorts in one charge has been the method constantly worked—the charge remaining in the retorts twelve hours. We learn that the results realized by working in this way have been, put generally: 13,000 cubic feet (estimated) per ton of second-class Durham coal. The coke has averaged 13½ cwt. per ton. The quantity of tar is considerably less than under ordinary working—about half; while the quantity of ammonia is greater than with horizontals. The coke is of the foundry coke type—showing in section that the gases are driven from the outside of the mass to the centre. The section of the coke has, in fact, quite a tree-like formation. No thick tar is observed; what tar there is being of a light oily nature. There is an entire absence of choked ascension-pipes; and the hydraulic main is always in a liquid state. The temperature of the gas immediately over the mouthpiece is 450° Fahr., about half way through the period of charge; whereas the temperature the same distance from the mouthpiece of the horizontals, taken at the same time, is 750° Fahr. From this one bed of inclined 10-feet eights, so set and so worked, Mr. Love realizes as much as he is able to do from fourteen of his horizontal retorts—that is to say, from seven 20 feet throughs. He puts about 8 cwt. charges in each retort every twelve hours; and in his horizontal retorts, he only charges, in the same length of retort, 3 cwt., or 6 cwt. in each 20 feet retort, in twelve hours.

These are the salient and extremely interesting results of Mr. Love's continued trials; and every point suggests matter for consideration and discussion. We hope for further good news.

LUMINOUS ADVERTISEMENTS.

Luminous advertisements have become very popular in commercial circles, as anyone can judge by a walk at night time in any of our cities and towns. The reason of this is that no one can come within seeing distance of such advertisements without being attracted by them, and watching for the development of the word or notice. Hundreds of persons pass by hoardings bearing printed advertisements without as much as turning their eyes to see the nature of the announcements; but not so with the luminous advertisement. It has a kind of magnetic influence that compels attention. In large measure, electricity has taken possession of this field; but gas is making a bid for supremacy, even in this direction, in the matter of cost and of equality in regard to convenience and effect. In the "Journal" for Oct. 16 last, allusion was made in our "Register of Patents" to a method of flash-light advertising by gas invented by M. Maurin, of Paris; and last week the actual thing was shown in use at No. 36, King William Street, E.C., where it is on exhibition. The controlling mechanical portion of the arrangement is of a very simple and ingenious character; and after witnessing a demonstration, its effectiveness can be certified. There is a small gas-tight tank into which the gas feeds, and in this is a wheel worked by the inflowing gas, which puts in motion a cylinder fitted with keys, which, at predetermined times, raise (we will call them) feeding-pipes which convey the gas to the pipes supplying the burners. The open ends of the feeding pipes drop into liquid, and so they are hermetically sealed. When a pipe is raised by one of the keys, the open end comes above the liquid, and the gas enters it, and so passes to the burner or burners placed behind the sign, where it is ignited by the bye-pass jets, which are continuously fed with gas by a separate pipe when the sign is in use. When the key releases the raised feeding-pipe, the mouth of the latter drops back again into the liquid—thus discontinuing the supply of gas and extinguishing the light. The invention, it will be gathered from this, is capable of all sorts of variations to meet the requirements of advertisers. The apparatus is made in four ways: (1) The whole word appearing, and then disappearing in one colour. (2) The whole word appearing, and then disappearing in two colours. (3) The word appearing letter by letter, and then disappearing. (4) The word appearing letter by letter, and then disappearing in two colours. With regard to working cost, the inventor gives the following as a basis of comparison: Gas used in No. 1 apparatus (four burners) 8 cubic feet per hour, cost about ¼d. Electricity, to show the same word, would require an average of at least three bulbs per letter, say twelve lights of 8-candle power each, consuming 0·3 unit, which would cost at 2d. per unit (say) ¾d., at 3d. 1d., and at 4d. 1¼d. With gas, using flat-flame burners, there is no cost for upkeep; whereas with electricity there is the constant liability to breakage of bulbs or fusing of wires, and the expense and annoyance of repairs. There appears to be nothing about the apparatus to get out of order; and the only trouble involved is the lighting of the bye-pass jets at the start, and then the turning off of the main service-tap to the sign when the display is finished. The apparatus can, of course, be made in any required size.

Another "Circular of Inquiry."

In the "Journal" for the 19th ult. (p. 461), we called attention to a revival of the attempt to get professional information "on the cheap," by means of a circular of inquiry which had just been brought to our notice. Within the past few days, we have received evidence, in the shape of a letter accompanied by a string of questions, that the trouble persists. The parties responsible for the control of a certain gas undertaking had under consideration the question of the price of gas, in view of the large increase in the cost of coal; and, in order to assist them in their deliberations, they requested their chief official to ascertain any particulars that might be useful. He accordingly sent round the following questions, with a request that they might be answered, and an assurance that any information given would be treated as confidential.

1.—What is the present price of gas charged by your company? Are any, and, if so, what, discounts allowed?
2.—What is the present price for gas charged by your company when selling gas by slot meter?
3.—What is the average price per ton paid by your company for coal?
4.—Out of what fund does your company provide the cost of the slot meters? How many slot meters have you in use?
5.—Does your company provide free fittings? If so, out of what fund is the initial cost provided? Is any rental charged?
6.—Does your company supply incandescent mantles at a reduced price to consumers?
7.—Is the lighting of the public streets supplied by your company?
8.—Do your directors contemplate raising the price of gas in view of the increased cost of coal? If so, in what direction?

There are two points about these inquiry circulars. One is that the parties who draw them up appear to be either unaware of the existence of parliamentary returns and other statistical literature, or prefer to get other people to write out information that they could readily obtain from reliable published sources. The other is the absurdity of promising to treat information as "confidential," when it is to be passed round for the perusal of members of a board or a committee, one (or possibly more) of whom may be more interested in coal or the labour question than he is in the gas industry. In the case under notice, the inquirer not only wished to have written information as to what many would be inclined to regard as the private affairs of the company whose official he circularized, but also as to the secrets of the board-room. A secretary could scarcely answer the last question without committing a breach of trust, seeing that he is not supposed to repeat anything outside the board-room, unless instructed to do so; and it is evident that there is a limit to the extent of information that any official is entitled to give, on his own authority, as to the finances or practices of his company.

Congress of Heating and Ventilating Engineers.—It is announced that the sixth annual congress of heating and ventilating engineers has been fixed to take place in Vienna on the 3rd to the 6th of June next, under the patronage of the Austrian Minister of the Interior, Baron Richard von Bienerth, and the Prefect of Lower Austria, his Excellency Count Erich von Kielmansegg. All interested in the progress of methods of heating and ventilation are cordially invited to attend the congress, of which full particulars can be obtained on application to the headquarters at 16 Seilerstätte, Vienna.

EXTENSIONS AT THE ENFIELD GAS-WORKS.

An interesting piece of reconstruction and extension has been recently completed at the Enfield Gas-Works. The carbonizing plant at these works consisted of two retort-houses, joined end to end; the oldest being a ground-floor house containing twelve beds of sixes, set back to back, with direct fires. The newer house was a stage-house one, with eight beds of nines.

It was decided to replace the direct-fired settings of sixes with regenerative fired settings of eights; and it was found that a bench containing fourteen beds of eights could be accommodated. But it was first necessary to raise the roof, and also at the same time to widen the house so that it should be possible to introduce machine-stoking in the future whenever this should become economical.

The alteration was carried out as shown in the illustration; the roof being carried on cantilevers supported in their turn by steel stanchions. These latter were designed to take the whole horizontal component of the wind pressure on one side of the house; the roof-shoes on the other side being provided with a sliding bearing, to allow for expansion.

A charging-floor was constructed at the same level as that in

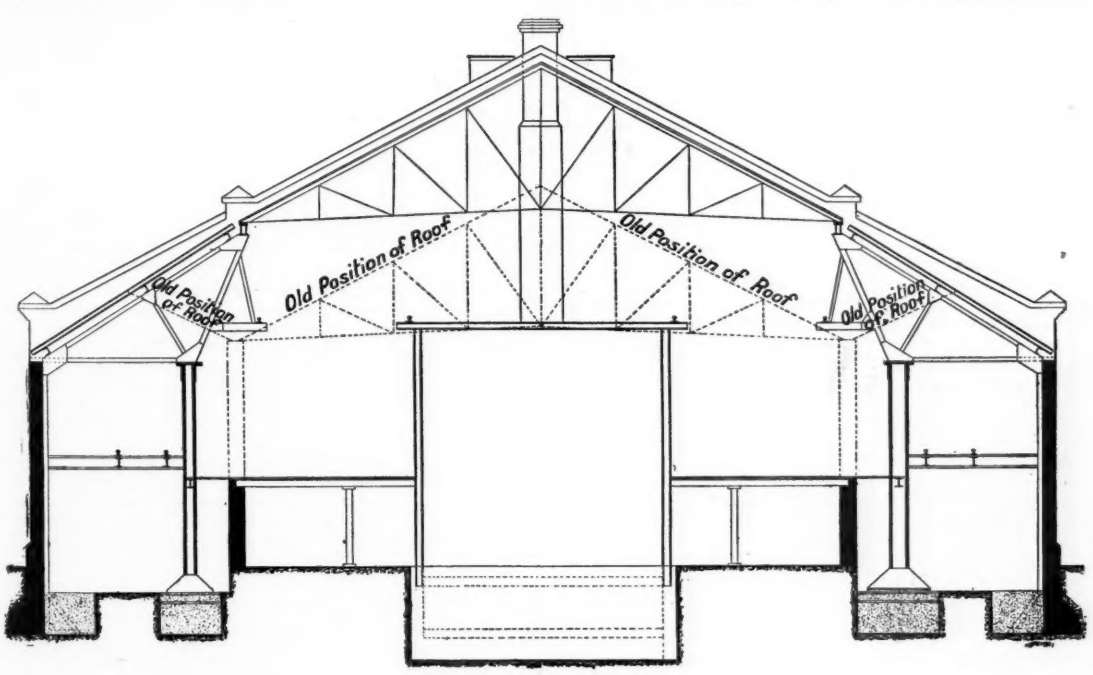
Reconstruction of the Enfield Retort-House.

the adjoining house; and the retort-arches having been completed, regenerative settings of the type associated with the name of Mr. W. A. Valon were installed. Similar settings were already in use in the adjoining house, but working with a common shaft for the whole bench; whereas in the new work each setting has its own separate chimney.

This work having been finished, it was decided to widen the other house in a similar manner, and to remove the division wall —throwing the whole into one house. This was satisfactorily accomplished; the roof being transferred direct from the wall to the cantilevers without taking down the principals or even stripping the roof.

The whole of the work was carried out to the designs and under the supervision of the Company's Consulting Engineers, Messrs. W. A. Valon and Son.

The improved working achieved by having regenerative settings in both houses, in place of one section regenerative and one section direct fired, has completely realized expectations. Compared with the results obtained previous to the remodelling, the gas produced per ton of coal carbonized has been increased by 1240 cubic feet; the coke and breeze available for sale per ton of coal has increased from 10 to 10·8 cwt.; the tar made per ton of coal has increased by a gallon; and the carbonizing wages have been reduced by 1·14d. per 1000 feet of gas sold.



Cross Section of the Retort-House.

THE SITUATION IN THE THORIUM INDUSTRY.

By Dr. C. Richard Böhm, of Berlin.

In an article of which a translation appeared in the "Journal" for Feb. 13 last year (p. 430), I endeavoured to show the position of the monazite business, which is of the highest importance to the thorium industry, and hence to that of incandescent gas lighting, being as these are inseparably connected one with another. I concluded the article by expressing the wish that the natural regulator of prices—supply and demand—and free competition might soon lead to healthy relations, so that the most recent development of technical chemistry might attain to its full importance for trade and illuminating purposes. Soon after the article appeared, came the rapid fall in the price of thorium nitrate from 53s. to 27s. per kilo., which forms an interesting subject for examination in regard to the speculative activity of the German Thorium Convention. As the Convention informed their clients of this fall in price in a brief circular, without any comment, there were naturally a large number of explanations in circulation as to the motive for the sudden drop. One explanation was that as the contract of the Convention with the monazite sand suppliers, Gordon and De Freytas, would run out on July 1, 1907, they wished, by means of the fall, to bring about healthier conditions by a renewal of the contract. This conjecture, however, is very improbable, as the Convention by such an action would lay themselves open far too easily to the danger that Gordon and De Freytas would enter into relations with the outsiders. The supposition is more likely that, by a sudden depreciation of their stock of the raw material, they would drive their competitors out of the field. In any case the effect of the sudden drop rapidly made itself felt. The proprietor of quite a small thorium works at Rixdorf, near Berlin, worked out his stock quickly, sold everything that had any value, and "vanished in the night," as was pertinently reported by a daily paper. Similarly, many firms outside the combine suspended manufacturing operations until further developments, but still delivered thorium nitrate for 26s. per kilo., since they bought up larger quantities from the Convention, in order to maintain their business connections, and gain time for buying-in cheaper raw material.

The recognition of this act of liberality did not fail to appear; for mantle manufacturers made use of the opportunity to no small extent, since they bought up mantle residues everywhere, and, with few exceptions, only obtained thorium nitrate against exchange. The dimensions to which this collecting mania had attained are shown by the fact that dealers went from shop to shop buying up waste mantles in the smallest quantities. There are even wholesale dealers who had as much as 100 kilos. of waste mantles, and who obtained their material from all parts of the world.

It is generally well known that the Convention had to pay a high price for their monazite sand, and, in consequence of the active pursuance of the mantle waste business, had in the past year a very bad time as regards thorium nitrate. It is further known that several mantle manufacturers made money quickly and without trouble; for they speculated in thorium nitrate, and in 1904 had greater balances. The surplus quantity of thorium could not be worked up, and it could not be employed for other purposes without considerable loss. It thus came about that during last year large quantities of thorium were placed on the market, and many mantle manufacturers received in exchange more thorium nitrate than they were able to make use of. These residual quantities were to be had for 42s. to 45s. per kilo. in 500 kilo. lots until the end of 1905. In the early days of last year, 300 kilos. of Convention thorium were offered for as little as 38s. Under such conditions, is it to be wondered at that the Convention could only with greater trouble sell their nitrate for 52s. or 53s. per kilo? According to Bruno,* no large manufacturer has paid the price fixed by the Convention. These prices appear only to have been on paper.

A third explanation is that the last step of the Convention can perhaps be directed against the Deutsche Gasglühlicht Gesellschaft, which, by means of its known indirect connection with the Gemania chemical works (which formerly only obtained their monazite sand from the Convention in such quantities as the need of their friends, the Exportgasglühlicht Gesellschaft in Weissensee demanded), made sure of its own supply of thorium. As the important mantle works of Richard Feuer and Co., in Schöneberg, near Berlin, were bought up by the Deutsche Gasglühlicht Gesellschaft, and the Exportgasglühlicht Gesellschaft belongs to this Syndicate, the Germania chemical works have probably had to deliver thorium nitrate for these three large mantle factories, and will accordingly do considerable damage to the Convention. Herr Feuer had, however, early taken this circumstance into consideration, and looked about for other sources of monazite sand. He managed, through a Paris firm, to import sand from the interior of Brazil. The working up of this sand is carried out, as in Brazil, by the aid of the Humboldt machine.

By means of the reduction in the price of thorium nitrate, the Convention contrived to put the Carolina monazite sand, which was formerly worked up by a few outside firms, quite out of the question for the present German thorium industry, since the concentration of the sand is saddled with considerable expense; besides the situation—which is far in the interior—necessitates increased transport charges. With a price for thorium nitrate of 50s. to 53s., the outsiders could still pay £75 per ton for a 5 per cent. sand. The monazite sand deliverers also still had a balance of profit. But matters are altogether different when the price of thorium nitrate sinks to 26s. and 27s. per kilo. The Convention get their 5 per cent. sand from Messrs. Gordon and De Freytas for £28 15s. per ton. For such a price as this, Carolina sand cannot be delivered; and therefore Carolina sand as a source of monazite sand for Germany is quite excluded. The American companies, who obtain their sand from Carolina, will also, under present conditions, be able to compete in America with the Convention, since, as is well known, there is a comparatively high import duty on thorium nitrate.

In order to prevent the outside firms from manufacturing thorium nitrate out of waste mantle ash, the Convention availed themselves of a means which displays evidence of little logic. They exchanged every kilo. of waste mantle ash, which had a value of 50s., for 1¼ kilos. of thorium nitrate, and by so doing themselves reduced the price of thorium nitrate from 50s. or 53s. to 40s.

The sudden drop in price of this material was, at all events, a very serious blow for a number of concerns—above all for the outsiders, who possessed, besides mantle waste bought up at high prices, more or less heavy stocks of nitrate. It even placed in jeopardy the existence of many of the firms. The thorium crash illustrates once more the power, as well as the danger, of the cartel. A further consequence of the cheapening of thorium nitrate was that the retail mantle dealer was requested by the manufacturers to lower the prices of these articles. Where this request was not actually made, the competition between the manufacturers all the same brought about a sharp cutting of prices. The man, therefore, who dealt in large quantities of thorium came into a decidedly difficult situation. The case was somewhat better for those manufacturers who had settled with the thorium ring, as the so-called "bottom-price clause" stood them in good stead.

It will be remembered that these probable developments incited a few firms in the incandescent mantle trade to summon a meeting, at which, in particular, the price manœuvres of the Thorium Convention were discussed; and the question was raised of a ring being formed between manufacturers of incandescent mantles. At a meeting held in Berlin on Jan. 24, 1906, 45 firms in the mantle trade assembled to bring about a settlement in price. However, a long, and at times very lively, discussion produced no result. Still another reason for the drop in price was the new find of thorium earth in Japan, corroboration of which, however, is still wanting. In the same way the latest discoveries in Queensland, Tasmania, Southern Nigeria, and the Transvaal, all turned out to be too poor in thorium earth. The Transvaal monazite sand was reported in many daily papers to contain 13 per cent. of thorium earth; but, after the most careful analysis, it was found to contain only 2·5 per cent.

The following facts may be considered as reasons for the sudden drop in the price of thorium nitrate: (1) The quickly organized business in the exchange of mantle ash; (2) the over-production of thorium nitrate; (3) the ever-increasing advance of Carolina monazite sand; (4) the decidedly disagreeable and appreciable competition, not only in Germany but also in America and France; (5) the recently developed system of combine between the mantle manufacturers, and the creation of their own thorium works. These factors together may well have placed before the Convention the alternative of undertaking a last deal, in order to avoid a still smaller sale in thorium nitrate manufactured from monazite sand than in the past year. This act I consider only as a forlorn hope of the ring, which made Gordon and De Freytas powerless, as their hands were bound in so far as only thorium manufacturers belonging to the combine have to decide the price of thorium nitrate.

The calculation of the Thorium Convention was also perfectly right, as what they wanted to attain they have attained—namely, the exclusion of the outsiders as suppliers of thorium, and the capture of practically all the German thorium supply. Of course, these results were bought at a loss of profit. Whereas formerly the manufacturers in the combine made about 15s. to 17s. per kilo. of thorium nitrate, they now only make about 7s. to 9s.* The loss of about 8s. per kilo. is, however, easily borne when one considers that the combine have made sure of almost all the German trade. The losers by this deal are only the Americans, Gordon and De Freytas, as they lose their portion of the profit (which was reckoned from 27s.), and are obliged to deliver monazite sand for £5 15s. per cent. per ton.† That this did not please the Americans is easy to see. On this account a split occurred in

* See "Zeitschrift für Beleuchtung" (Berlin), Vol. XII., p. 40.

* 27s. per kilo was accepted as cost price, the difference between 27s. and about 48s. went in three parts; hence the manufacturers made about 7s. The real cost price of thorium nitrate, however, is not 27s. per kilo., but 17s. to 19s. The profit of the manufacturers in the Convention therefore amounted to 8s. or 10s., and, in addition, 7s. After the price of thorium nitrate was reduced to 27s., they made only the difference between the actual cost price and 26s., as 3 per cent. discount was given on the 27s. Therefore their profit amounted to 7s. or 9s. per kilo. Since September, 1906, a new basis has been taken, which comes appreciably nearer the real cost of production of the thorium nitrate.

† The expression "£5 15s. per cent. per ton" means that the price of monazite sand was £5 15s. for each 1 per cent. of thorium earth. A sand containing 5 per cent. of thorium earth was, therefore, delivered to the Thorium Convention for £28 15s. This price is likely to rise somewhat in the early future.

the Convention immediately after the drop in prices—one group wanted to raise the price again, the other desired to set it still lower than 27s.

In order that the mantle manufacturers shall not again speculate in thorium nitrate and cause over-production the following year, Gordon and De Freytas have put an obstacle in their path, as they only permit such a delivery of thorium nitrate as will satisfy their actual annual need. In this way, Gordon and De Freytas now control the thorium market, and therefore their monazite sand depot in Hamburg. On this account, the explanation given by Bruno, that the outsiders had made contracts with the Convention to get thorium nitrate at 26s. per kilo., in order to remain in connection with their customers in view of the above arguments, can only appear as a false step.

Now that we have thoroughly studied the past and present of the thorium market, we will just take a glimpse into the future. To-day all who are interested in the matter ask the question as to how long these unhealthy relations will last—whether the former price of 53s. per kilo. will not soon be replaced, and whether the already sickly Convention will not fall to pieces. It is not to be thought for a moment, as matters now stand, that the Convention will survive. Possibly Gordon and De Freytas will enter into relations with rising firms for the supply of monazite sand, as these two (Gordon and De Freytas) must in time form an alliance. The thorium manufacturers of the combine will not ride so high this year, but must also take their present enemies—at least, the larger ones—into the combine; so that a great Syndicate for monazite sand and thorium nitrate will arise.

The following argument certainly bears out this acceptation: The Convention recently allowed Gordon to deliver 500 tons of monazite sand to the Deutsche Gasglühlicht Gesellschaft for £50 per ton (5 per cent. of thorium earth). This means that the Auer combine appeared too strong for the Convention, as they had entered into a hard fight with them. Moreover, the Convention will have felt a pang of remorse, as since the fall in the price of thorium nitrate their monazite sand suppliers had to work without profit, as at £5 15s. per cent. per ton nothing at all remained for Gordon and De Freytas after taking into account the high expenses and tariff. It was therefore nothing more than right that Gordon, after a long time, could again make a little pile of £12,500. The Deutsche Gasglühlicht Gesellschaft willingly paid £50 per ton, since their deliveries of mineral from the interior of Brazil were behind, owing to a dispute with their Paris middlemen.

In well-informed circles, it is an open secret that the Convention is ready to give way and gradually bring about healthy relations. By their delivery of 500 tons of monazite sand to the Deutsche Gasglühlicht Gesellschaft, they have shown a willingness to do so. To whom the German Convention will now confer their great favour is the question. In the same way it is also a question of how high the price of thorium nitrate will rise if the expected combine for monazite sand and thorium nitrate has been founded, possibly even higher than 53s., certainly it will not be lower. A rise in the price of thorium nitrate was, therefore, not altogether unexpected; so that a recent circular issued to the individual manufacturers did not cause surprise. It was here made known that the Convention had decided to raise the price of thorium nitrate by 5s. per kilo.—that is to say, from £1 7s. to £1 12s.—and that no contracts could be made beyond Dec. 31, 1907. It is, therefore, not at all unlikely that the price will still rise higher. Considering that lately the other raw materials used in manufacturing incandescent mantles—for instance, yarn—have also got dearer, it may safely be assumed that in the coming season incandescent mantles will experience a rise in price.

Then, also, one must not leave out of consideration the Brazilian Government. As Carolina is not productive enough, Brazil has in the meantime no competition to fear. So long as this is the case, the thorium industry will be dependent on Brazil. As Brazil needs money perhaps more than any other country, its Minister of Finance would be very shortsighted if he did not take the fullest advantage of the present situation of the incandescent gaslight industry. The contracts with Gordon and De Freytas will not prevent him carrying out his intention. He will find some way or other to conclude new contracts with exporters. It is already stated that now the law case, in which the Federal Government were successful, is over, these two parties—the federal and provincial governments—have come to an agreement, by virtue of which an export duty of £100 per ton is to be placed in future on monazite sand derived from the deposits belonging to private owners. We should, therefore be face to face with a monopoly of Marinhas sand. This acceptation is borne out by the fact that Gordon and De Freytas are exporting from Brazil as much monazite sand as possible. They are also taking precautions to prevent the fact from being observed in the import lists, by importing into Germany by various ports. They have already 10,000 to 12,000 tons in stock in Hamburg. When it is remembered that the manufacturers made an annual profit of £20,000 to £30,000, the question is involuntarily asked in Germany, Why were these manœuvres of the Convention necessary? They will probably only cost money for the consumers, while foreign countries get the benefit.

At the meeting of the Metropolitan Water Board last Friday week, the salary of the Clerk (Mr. A. B. Pilling) was increased by £250 per annum as from the 1st prox.

FIRST IMPRESSIONS OF AMERICA.

By A. J. B. Little.

I have been travelling since the 26th of January, *viâ* New York and Philadelphia, and left the latter city on the 8th of February; and, as first impressions are often correct, I give mine, in the hope that they may be interesting to readers of the "Journal."

Lighting Methods in Philadelphia.

In Philadelphia, which ranks in population, in the United States, next to New York and Chicago, the gas supply is in the hands of the United Gas Improvement Company, who were granted, in September, 1897, a lease for ten years. As this will expire next September, attention is now being drawn to the terms on which the Municipal Council can bring it to an end. Prominent citizens say that possibly the great stir going on arises out of a desire to find a fighting cry for the new candidates who are endeavouring to get a four-years election to the Council; but, in any case, the whole atmosphere is darkened with the stir and dust of these "new brooms." Coming from the other side of the Atlantic, one hoped to keep clear of the municipalization fever; but if this has not reached the epidemic state prevalent in England, it is none the less very insidious in its efforts, especially with reference to the gas question in Philadelphia. The conditions are hardly parallel to those obtaining in England, as the following facts indicate. When the Company took over the gas-works, they agreed to pay the city 10 per cent. of the amount received from the consumers; and in the nine years during which the lease has been in force, they have paid over no less than £890,000, and the amount has steadily increased from £40,000 to £142,000 a year. Whether for use as a "plank" on the party platform or really in order to terminate the lease, the Council now give notice of their desire to clear out the Company. But to do this the city will, according to the agreement, have to refund all moneys spent for the "alteration, enlargement, betterment, and improvement of the buildings, apparatus, machinery, mains, pipes, services, connections, meters, appliances, and appurtenances of the Philadelphia Gas-Works." The claim of the Company is for upwards of £4,122,000. The Committee of Investigation will not agree to any such sum; and the Company will not accept the finding of the Mayor's Committee. The latest development of the case is a reply by Mr. Dolan, the President of the Company, to a letter sent by Mr. Weaver, the Mayor. I give the unreasonable reply in substance.

In his letter, Mayor Weaver advised the Company as to the appointment of three gentlemen as a Commission under a resolution of the Council, and asked "What arrangements can be made for the Commission examining the books and papers bearing upon the question [*i.e.*, the accuracy of the claim for £4,122,000]; and also whether any person connected with your Company, desired as a witness, will appear before the Commission upon their request that he is wanted." In answer to this, President Dolan said they had complied with the provisions of the lease by filing a full annual statement with the Controller of the City. "Examination, auditing, and verification have been made under his supervision by two or more of his appointees, who devoted in each year about three months thereto." It would be thought that the accounts thus presented, verified, and accepted would be taken as conclusive; but, as in England so it is in the States, the Council now insinuate that they have not had fair play, and wish to go through the whole of the accounts for the past nine years. To show how open the Company are, however, though a re-examination of the books is not within the rights of the Council, they, stipulating that they will not recognize the finding as binding upon them (or, as you would say, "without prejudice"), are entirely willing to permit the representatives of the City to examine the accounts, books, and vouchers covering the expenditure, and, further, to allow the Commission to examine the buildings and plant. This, then, is how things are being worked by the municipal authorities of Philadelphia; and a great deal of party capital is being made out of the incident by would-be councillors, who are trying to catch votes.

Electric Lighting of the Streets and Railways.

Having shown the inner workings of the gas question, I will make a few remarks as to the way in which the matter affects the citizens. Knowing this to be the home of electric lighting, one expects to find the streets lighted by arc lamps. But, bearing in mind the boast of Americans, a feeling of disappointment creeps over the sightseeing Britisher when he first examines by night the result of years devoted to improving electrical appliances for street lighting. In the first place, the carbons burn in transparent globes, and as the lamps are close to the ground, the effect on the eyes of pedestrians is trying in the extreme. It is accentuated by the fluctuations in voltage, which are, of course, more noticeable with the glow-lamps. But for the lights provided by shopkeepers for interior show purposes, the pavements would be dark indeed, even though at the period of which I am writing there had been a 15-inch fall of snow, which had become solid by frost and remained white, and thus acted as a grand natural reflector. What a contrast it is to stand near streets lighted respectively by electricity and gas, as one can do in some parts of the city! Though the ordinary pressure of gas is employed, the incandescent gas-mantles, mounted in cylindrical globes fixed on neat

pillars, make a very effective show, and serve the purpose of guiding pedestrians in a way the glaring and stuttering arc lights cannot aspire to. Especially noticeable is the favourable contrast of gas lighting if a train is taken from the Reading Terminus of the Pennsylvania Railroad to a suburban station a few miles out. At the terminus, the light is provided by enclosed arc lamps with a sprinkling of glow-lamps; and to a stranger seeking a train on a certain platform the task of steering his way in the gloom is almost terrifying. On the outlying stations, on the contrary, the ordinary "C" burners and Welsbach mantles make one's progress easy and safe, notwithstanding the rapidity with which a train pulls up and draws out of the station. In the trains, gas lighting is in use, except on very long runs of (say) two days' duration, when electric lighting is the method adopted. But here again gas-jets are provided, and not merely for show, as one can see by surreptitiously turning on the tap and applying a light. A similar arrangement is in use in hotels where the electric light is employed for interior illumination. On all sides can be seen elaborate brass fittings with holders and glow-lamps; and one is astonished at the ingenuity of the designers, who in nearly every case manage to arrange a convenient tap, globe-holder, and gas-jet above the electric lamp. These also are not for show purposes only, as the gas is lurking behind each tap ready for use when the electric light fails; and nearly everywhere a thoughtful management has made rules to ensure that in proximity to the jets a full box of matches shall be kept in readiness.

Another point that may be touched upon is the frequency of fires in the city, in most cases traceable to crossed electric wires. Quite recently, a large mansion was burned down through this cause, and art treasures of priceless value, including paintings by old masters, were lost. In one day there were as many as seven fires, more or less serious; and one in the centre of the city was only subdued after a number of firemen had been injured, and most of them had had their clothes frozen stiff upon them.

Good Business in Gas.

In passing through the Harrisburg and Pittsburg districts, a great deal was heard of shortage of gas. In a number of cases, large works had been shut down compulsorily through lack of coal gas, and thousands of men were consequently thrown out of work for a day or two. In other cases, the supply would fail early in the morning, and workers had to go out after partaking of a cold breakfast, leaving the family shivering at home if they could not find relief at the houses of friends in other parts of the town. Such a condition is regrettable; but when one considers that it is in some cases the outcome of an increased demand for gas amounting to 60 per cent. per annum, those who are in charge of gas interests may be excused the abnormal state of affairs.

Summing up, one would say, after a cursory examination of the gas supply in Philadelphia, that it is entirely satisfactory so far as it goes; but it will take time and a lot of hard work to oust the electric light from the business portions of the city. The gas is of excellent quality, and the needs of the consumers are cared for in an admirable manner both by the Gas Company and the makers and vendors of fittings and supplies. Taking as an example the show-room of the Welsbach Company, one sees that for artistic quality and soundness of manufacture, the reading-lamps and ceiling and wall fittings are equal to, and possibly even surpass, what one has been accustomed to in England. But, on the other hand, one is immediately struck by the absence everywhere of neat and useful gas stoves and fires, such as meet the eye everywhere in the Old Country. An object-lesson is provided in places where electric light and gas both have an innings, as, without fail, in places where an unsurpassable light is needed for accurate work, there the inverted "Bijou" incandescent gas-lamp is always in use, while alongside it the electric glow-lamps remain in the cold. I have already alluded to the fluctuations in the voltage. I can say further that a lowering takes place at least every 15 minutes; and it is most trying to both temper and eyesight. It is when the light fails altogether, however, that the trouble begins; and this it does by no means infrequently. To give one instance, large works were thrown out of gear for many minutes by the outgoing of all electric lights, and, of course, heavy pecuniary loss resulted.

Heating of Dwelling Houses.

In conclusion, a few remarks may not be out of place on the much-vaunted system of heating the houses by hot water and steam radiators. After reading the advertisements of makers, and hearing the condemnatory remarks made by Americans regarding our open-grate fires, it may be refreshing to hear the other and true side of the story. In some cases a regulating-tap is fixed which can be used to turn the supply on or off the radiator. After sitting in the public rooms of the hotel for some time and getting far too warm in the dry atmosphere, at a temperature maintained at about 75° Fahr., one goes to a private room and turns on the supply. To one not used to the arrangement, a fright is the result, as the valve starts chattering like a colony of monkeys, and keeps up the performance for about ten minutes. When once in operation, the agitation in the box of tricks is not so violent; but all night long there is kept up a splutter and gurgle of the heating agent and a creaking and murmuring of the joints which, to say the least, is slightly distracting. In a great number of things the citizens of the United States are better served than Britishers; but in heating and lighting they are far behind, and must "hustle" to make up leeway.

TARRING ROADS AT AIX-LES-BAINS.

In a recent number of "Technique Sanitaire," M. Luya, the Municipal Engineer of Aix-les-Bains, gave an account of a piece of road-tarring work carried out by him early last year. In view of the competitions instituted by the Roads Improvement Association, to which several references have been made in the "JOURNAL," the particulars furnished may be of interest.

M. Luya commenced his experiment by selecting what was probably the worst material in the country for tarring roads—viz., a soft, friable quarry limestone, costing 4 frs. per cubic metre delivered on the spot, compared with 14 frs. for hard stones (quartzites) and 5 frs. for harder river pebbles. His choice was guided by the consideration that if a bad material, treated with hot tar, behaved well when in use, and formed a solid road, it could be employed economically, instead of expensive hard stone, in side roads. The saving effected made it possible, without increased cost, to treat hard stones for use in roads in which there was considerable traffic, and render them more durable. Accordingly, in the rainy season, when it was difficult to find work on the roads for the municipal employees, it was thought that they could be usefully occupied in tarring stones, under cover, by means of one of the ordinary tar-boilers and two wire-gauze baskets, each capable of containing from 45 lbs. to 65 lbs. of stones. A bulk of something like 42 cubic yards of stones was treated by dipping them into the hot tar for five minutes, so that each stone could be well coated. The tar used was at the rate of 220 lbs. per cubic metre (1·3 cubic yards), whereas for similar work carried out at Zurich only one-fourth of this quantity was employed. The tar was obtained from the Aix-les-Bains Gas-Works at the high price of 75 frs. per metric ton (2200 lbs.); and the labour involved cost 2·81 frs.

In the spring, the stones which had been treated as described were utilized to ballast a thickness of about 4 inches and a length of 55 yards of roadway, which was covered with sand and solidified by a steam-roller in the ordinary way. The rolling made the tar rise to the surface of the road, which then had the appearance of newly-tarred ballast. After six months' use, the road surface was intact, and there had been no trouble with dust or mud. During the first few days, it was somewhat spongy; but afterwards it became hard and resisting, but not slippery—the stones appearing in mosaic on the surface. The roadway consisted of an impermeable tar concrete, which retained its good condition in all weathers. The result was so encouraging that it was decided to treat another road, having a gradient of 6 to 7 in 100, in the same way, but with harder stone.

M. Luya concludes his article with a few remarks on the surfacing of the highways at Aix-les-Bains last summer, when about 2200 square yards of roadwork was carried out. When it was commenced, there was a general outcry against it, both on account of the time of year selected, when the thermal springs are much frequented, and the odour arising from the tar. But as soon as the good results were recognized, work had to be restricted to the amount allowed in the estimates, and not carried out to the extent demanded by the residents. The tarred roads withstood the effects of six months of exceptionally dry weather; and they were much appreciated. So great was the change of opinion, that the Municipal Council included in the budget for the present year an amount sufficient to cover the cost of tarring upwards of 100,000 square yards of roads, avenues, and streets throughout the town.

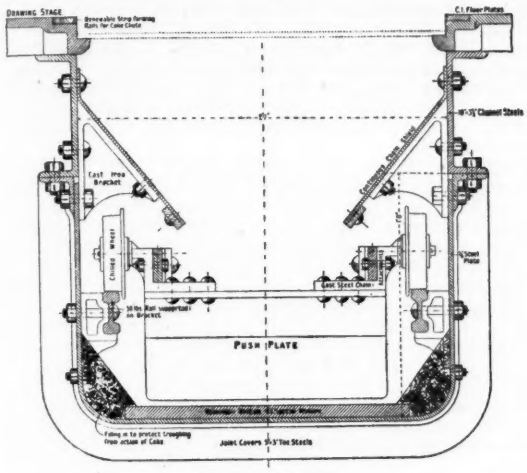
Large Bye-Products Works Suggested for Italy.

The Editor (Sig. Vittorio Calzavara) of "Il Gaz" has, in a recent issue of his paper, launched a suggestion for a large central bye-products works, which might serve as the gathering-ground for many gas-works which at present do not work up their bye-products to the extent that he thinks they might. He points out that gas has now to meet a continuous and daily struggle among many and various competitors. Nothing to strengthen the gas industry can one afford to overlook. In the early days of gas lighting, such competitors as we have to face were undreamt of; and our forefathers made gas in perhaps too empirical a way. But, in their defence, it must be remembered that the science of chemistry was then only in its early stages. Now, with our more profound knowledge of it, many gas bye-products can be more thoroughly worked up than ever before. Sig. Calzavara is evidently impressed with what he has seen done in this respect in a tour in England, particularly as regards tar. He also refers to the examples of France, Switzerland, and Germany. In the last country he saw three works, one of which got from its tar a commercial product different from the other two. He thought that, as in Italy the production of tar was limited in gas-works, if several of these combined and sent their tar to a central depôt, it could be thoroughly worked up there, and fewer products would then have to be imported. He promises further consideration of the suggestion, and the publication of more details in due course, when practical questions have been discussed. He states that there is not at present in Europe such an establishment as he proposes, but that there is one in America and also one in Japan. It will be of interest to observe the development, if any, of this idea, which has more than once been put forward.

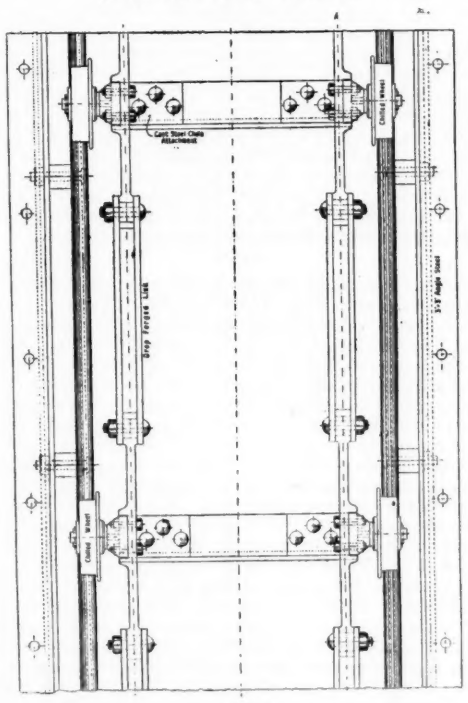
MR. HERRING'S NEW PUSH-PLATE CONVEYOR.

Towards the close of the paper on "Elevators and Conveyors," read by Mr. W. B. Leech at the recent meeting of the Eastern District Section of the Scottish Junior Gas Association, and noticed in another part of the "JOURNAL," the author referred to a new push-plate conveyor for hot coke which had been devised by Mr. W. R. Herring, and introduced at the new gas-works of the Edinburgh and Leith Gas Commissioners at Granton. The appliance is shown in the accompanying illustrations.

As users of double-chain conveyors are aware, the unequal expansion and contraction of the two chains is apt to bring about a slackness, particularly when dealing with long lengths. This slackness sometimes causes one or both chains to ride the



SECTIONAL ELEVATION OF PUSH PLATE CONVEYOR FOR HOT COKE.



PLAN.

Herring's Push-Plate Conveyor.

sprocket-wheels, and throws the conveyor temporarily out of gear. In order to obviate this inconvenience, Mr. Herring introduced powerful coil springs at the trailing end, so as to maintain a reasonable tension on the chains. This was found to be of considerable advantage, ensuring as it did the free and smooth working of the conveyors. But it was not a sufficient safeguard during holiday times. To remedy this, the return chain, for a portion of its length in the centre of the retort-house (subsequently altered to the exterior), is made to run free of its guides, so as to take up the unequal expansion of the double chain when alternately transmitting hot coke or returning empty. At Granton the chains are each more than 1000 feet long, and are subjected to extreme changes of temperature. Mr. Herring says the springs at the trailing end, though very effective, required some personal attention in order that the adjustments on the tension screws might be properly carried out. This was not only a cause of some expense, but was also a variable quantity at holiday times. Mr. Herring therefore decided to adopt the expedient mentioned; and by allowing 30 or 40 feet of the chain to sag, it took up its own variations in length, and maintained a fairly regular tension on the springs at the trailing end. Nearly twelve months' experience of the device has fully established its efficacy.

CALORIMETRY, AND THE MEASURING AND TESTING OF PRODUCER GAS.

At a Meeting of the London Section of the Society of Chemical Industry yesterday week—the CHAIRMAN (Mr. R. J. Friswell) presiding—Professor C. V. BOYS, F.R.S., exhibited his gas-calorimeter, explained the lines of reasoning he followed in its construction, and generally described the instrument. Succeeding this, Professor R. THRELFALL, F.R.S., submitted a paper on "Five Years' Experience in Measuring and Testing Producer Gas."

The Boys Gas-Calorimeter.

Professor Boys explained that the time available for him that evening would not admit of his reading a paper giving a full account of his gas-calorimeter, nor was there any occasion for such a paper being presented, as the calorimeter had previously been fully described by him.* But he understood that many of those present that evening would be glad to have an opportunity of seeing the instrument in operation, and of having its mode of working demonstrated. Referring to one of the calorimeters on the table before him, which had just been started as for a test, and to a sectional diagram of the instrument on the wall, he proceeded to indicate the more important differences between it and the earlier general type of gas-calorimeter. He said that when, in accordance with the new requirements of Parliament as to gas-testing in London, it became necessary for the Metropolitan Gas Referees to prescribe apparatus for determining the calorific power of the gas, he had, as the representative of physical science on that body, to study closely the subject of gas-calorimetry. He found that the well-known Junkers calorimeter was an excellent instrument; but it had certain inconveniences which he set out to overcome in devising a new calorimeter.

It was necessary with the Junkers calorimeter to jump up and down steps in order to make alternate readings of the thermometers; and the outlet-water thermometer was not so steady as could be desired. Also a good deal of time elapsed after lighting up before the outlet water had attained its final temperature. He therefore started to design a calorimeter in which all the thermometers should be at one level, so that the observer could read them all from the same position, and in which there should be no parallel routes for the circulating water, of which (he added later) the volume contained within the instrument should be as small as possible. The final result of his efforts was the calorimeter before the meeting. In order to bring about the transference of heat from the products of combustion to the circulating water as rapidly and completely as might be, he had availed himself of the wire-wound pipe, invented by T. Clarkson for motor-car radiators, for the circulation of the water. He had given up the bunsen type of burner commonly used in calorimeters in favour of a pair of Bray's No. 3 union-jet burners, set with the flames parallel, and had thus been able to reduce the height of the calorimeter.

The gas was burnt at the rate of about 5 cubic feet per hour. The air supply was determined by the depth of the opening around the base of the instrument, and by the number and diameter of the holes provided at the top for the escape of the products of combustion. The dimensions of these openings had been so fixed that the flames burnt without smoking, even when the rate of consumption rose to 6 cubic feet per hour. In order to avoid over-heating of the inner chimney, he had put water to a depth of about an inch in the lower part of the container or outer vessel, and the lower coils of the circulating water-pipe passed through this water; so that the latter was kept cool by transference of heat to the circulating water. As, however, only the lower portion of the chimney was in contact with water, the upper part remained sufficiently hot to prevent any deposition of condensed water from the flames upon it. Heat radiated downwards from the luminous flames was, for the most part, returned to the calorimeter, either by the inflowing air or by reflection from the bright tinned upper surface of the base of the instrument. In order to preserve the thin wire of the coils from attack by the very dilute sulphuric acid resulting from the combustion of the sulphur in the gas, the coils were, when the instrument was not in use, kept immersed in water containing a crystal or two of carbonate of soda. They were lifted out bodily with the top of the instrument from the containing outer vessel, without removing the thermometers or water connections, and placed in a glass jar of the right size containing the alkaline solution. By this means the wire-wound coils were preserved bright and unattacked. In proof of this, he exhibited the coils of one of the calorimeters which had been in regular use in one of the London testing-places for nearly a year, and pointed out

* See "JOURNAL," Vol. XCII., p. 808.

that they showed no sign whatever of attack or corrosion. The Junkers calorimeter, not having the fine wires and different metals in intimate contact, would not be so susceptible to injury from the feeble sulphuric acid; nevertheless he had been shown some of these calorimeters which in a short time had suffered greatly from corrosion. The calorimeter he had designed was not intended for the determination of the heat evolved to such a degree of exactness as might be required in purely scientific researches, but was intended to be as precise an apparatus as was consistent with practical requirements in respect of speed and convenience in working. It could no doubt be modified to give slightly greater precision, and the already quite trifling heat losses could be guarded against; but no appreciable gain would result to the calorific value attributed to the gas.

Measuring and Testing Producer Gas.

Following the exposition by Professor Boys of the calorimeter he invented, Professor Threlfall presented his paper. It was a voluminous one, in which were traced the results of five years' experience in measuring and testing producer gas. The period of experience was long, and the lines of research and decision varied; and therefore—the time at the disposal of the meeting compelling compression—the Professor scanned the contents of the paper, and illustrated his points extensively by drawings and diagrams on a lantern sheet. The method of description was interesting and most entertaining in places—for most of those present; but it does not give the writer of an account of the work who is denied access to manuscript and diagrams pending their publication in the Society's own "Journal" much scope for lucid explanation. Those interested in the subject will therefore have to look for the details in the Society's publication. In speaking of the measurement of gas, Professor Threlfall referred to large quantities—that is to say, millions of cubic feet an hour, and consequently many millions of cubic feet a day. In setting out upon this subject, it appeared that he did not do so with the object specially of measuring large quantities of gas, because, like other chemists, he considered that the ordinary method of measurement for considerable quantities was necessarily and fundamentally wrong. Originally he was particularly introduced to this work by having to test a large alternator. For that purpose, he had to measure a stream of air, and had his choice as to what velocity he should use. He was so successful in measuring the velocity of the air, and therefore the volume of air passing over the alternator per hour, that in this way he was able to obtain the efficiency of the alternator. When he first began to measure gas, he took the so-called Fletcher gauge, which was an apparatus that had long been used in chemical works; but with this he found certain objections for his particular purpose. He then took the Pitot tube; and with it he had been a great deal more successful. He showed on the screen the arrangement that he had used in practice; describing in detail by the aid of the picture the alterations he had made to meet the difficulties of tar, dust, and dirt for the measurement of the producer gas. He had tried to obtain reliable means of measuring small amounts of pressure; and he illustrated the instrument devised for the purpose. He confessed, however, that the Cambridge Scientific Instrument Company made a nicer instrument; and it gave the means by which, in one observation, the pressure could be determined equal to an accuracy of $\frac{1}{270}$ mm.

Attention was next devoted to the theory and practice of measuring pulsating streams of gas or air—such, for instance, as are produced by pumping by gas-engines or otherwise. Here there was introduced the Threlfall stream-gauge, by which the differences of pressure are transmitted to a bell, hung from springs. The measurement was obtained round a dial, having a range the full round of the scale. The smallest was up to 0·5 mm.; the second size, 0 to 2 mm.; and so on. But the 0 to 2 mm., it was stated, was the most useful scale for practical work. After the stream-gauge, the author made a gas-meter. In this a bell was hung from the arm of a balance; the other arm carrying a weight, which dipped into a vessel containing oil. The weight was so shaped that the angular motion of the beam was exactly according to the velocity. [Incidentally the author mentioned here that he used a Weldon Mud purifier to remove the sulphuretted hydrogen from the gas.] As the beam turned down, it allowed an integrating wheel, connecting with trains of wheels, to move across a glass disc, being driven by an eight-day clock. The objection had been raised to the fact that the whole of the moving parts of this meter were carried on rafts floating on oil. But the instrument, Professor Threlfall said, had worked beautifully; it had, in fact, done most satisfactory work for him for four years. It had never been touched or taken down—nothing whatever had been done to it but to wind the clock. The pressure at the point where the gas was measured was about 2 feet of water.

The author next gave a description of the means adopted for determining the density of the producer gas. Here, again, the author's description by illustration and curves defies any proper explanation of the apparatus used. But eventually, the issue of the whole work was presented. After four years' measurement of producer gas—from four producers, each using about a ton of fuel per hour, with a gas-meter at one end and stream-gauges at each point of delivery and use—the results of balancing the make and distribution (shown by curves) indicated that agreement to within about 2 per cent. could be attained in practice.

The methods hitherto proposed and practised for the determination of the volume of gas produced per ton of coal otherwise than by the author's meters, were also considered, and examples were given of the results of balancing on ammonia and carbon. In measuring gas by the ammonia-balance, the amount of ammonia in a cubic foot of gas was determined, the quantity of sulphate of ammonia made in a day, and the quantity of coal used in a day being known; and with these factors an idea could be formed of how many cubic feet of gas were produced per day. Professor Threlfall described the apparatus used in this form of determination. The one to which he referred passed many hundreds of cubic feet of gas per day, which was necessary to get a reasonably correct balance. But to show how close were the gas production quantities as determined by the ammonia test and by actual measurement, he gave the following relative figures: By the ammonia test 114, by meter 109; by the ammonia test 125, by meter 110; by the ammonia test 115, by meter 105. There was here something like a 10 per cent. error every day; but taken over a period, they came out very much the same. A most favourable way was to balance on carbon. Many years ago the author made an elaborate trial, and got a very good balance by this method and by meter, and was able to account for all the carbon. He did not think a balance on the carbonic acid gave very accurate results; for it was not easy to estimate with accuracy the carbonic acid.

Turning to producer gas temperatures, Professor Threlfall said there was nothing more important than a correct knowledge of the temperatures in producers—particularly those working with ammonia recovery. This had led him to adopt a system of thermocouples; and these were read by means of a potentiometer, suitably divided to read direct, and fed by a very large Clark or cadmium cell. Following on, the author spoke of the necessity of calorimeter tests, especially where one had to do with gas-engines, in view of the variations in the quality of the gas with variations of production by gas-producers. He referred to the instruments he had devised, and considered he might claim that he had attained reliability and durability. A continuously recording calorimeter which he had designed, but which was not described in the paper, he acknowledged had given him a great deal more trouble in its perfecting than any other he had had to do with.

On the subject of the testing of sulphur in producer gas, he described the Gas Referees' test. In producer gas, vastly greater quantities of sulphur than in ordinary gas had to be dealt with; and for this purpose the Referees' test was less suitable than a modification of Valentine's test. The discussion of this matter by the author covered both the determination of sulphuretted hydrogen and of total sulphur; and it was shown that it was fatal to the sulphuretted hydrogen to employ a gas-meter containing water—no matter how long it might have been in action. The next part of the paper dealt with testing producer gas for tar; and a proposal was made for a standard method of carrying out this investigation. In passing, the author mentioned that he found sawdust the best material for scrubbing producer gas; and the working of two purifiers in series the best system.

There was a brief discussion of the communications. In the early part Professor Boys stated that he had omitted to pay a tribute to Messrs. John Griffin and Sons, who made his calorimeter. The first instrument they produced for him, if not absolutely right, was at least exact with his drawings. With a very small alteration, the first instrument was in the form in which it was now exhibited. Other speakers made many complimentary remarks about both Professor Threlfall and Professor Boys. One inquirer sought to learn of Professor Boys whether the water in the bottom of his calorimeter, when the apparatus was working (say) with 10-minute estimations over a period of 24 hours, would not get hot, and thus cause heat loss. The same gentleman asked whether the instrument had been used for producer gas, how it compared with the older instruments if worked alongside them, and how it compared with calorific values worked out from a careful analysis of the gas. There was agreement on his part with Professor Threlfall's assertion that gas measurement by chemical means was totally unreliable. He had made estimations from ammonia in gas within 5 per cent. over considerable periods. But even that was not so reliable as measurement by meters. He believed the continuous calorimeter of Professor Threlfall would be of great use; and he agreed that a standard method of estimating tar was desirable. In some remarks by Dr. Harold G. Colman, he expressed disappointment that Professor Threlfall's paper did not contain an account of the continuously recording calorimeter. The testing of calorific values was a matter of considerable interest to those connected with gas supply in any form. As calorific power was getting of prime importance in gas supply, they wanted an instrument by which the manufacture could be controlled in regard to calorific power. He hoped before long there would be available an instrument suitable for the purpose. As to Professor Boys' paper, he (Dr. Colman) had made many hundreds of tests with the Jünkers calorimeter, and he had felt very keenly the nuisance when he was making a number of tests per day of having to run up and down steps to read the thermometers. To have three thermometers in positions where they could be read at once (as in Professor Boys' instrument) was a great advantage. The whole thing was get-at-able. Any part could be reached and renewed with ease. With the

Jünkers calorimeter, if anything went wrong, it had to go back to the makers, because the parts were soldered up, and one could not get to the inside. Respecting corrosion, he must say that, so far as the Jünkers instrument was concerned, he had not found any difficulty with it. He thought Professor Threlfall's paper would be of great interest even for those who were dealing with gas in what he supposed the author would call small amounts —say, 5 to 10 million cubic feet per day—where ordinary meters were sufficient to measure the gas. The instruments devised for measuring different streams of gas should be of immense value. They should also be most useful in water-gas manufacture. The amount of air that was blown into the generators made an enormous difference to the working. Under ordinary circumstances, the only measure they had of the amount of air that was passing through the fuel was the blast pressure—the actual static pressure of the blast. With an instrument such as the one just described, it would be possible to check the amount of air passing in; and for that purpose it would be very valuable.

In his reply, Professor Boys showed that the heating of the water at the base of his calorimeter was fully provided against; and the water never rose more than a degree or two above the atmospheric temperature. He had not used the instrument for testing producer gas. He had made some comparisons of the instrument with the Jünkers calorimeter. In that particular part of London, they were provided with a gas which, he believed, was striking. The calorific value constantly changed—sometimes spasmodically, but not as a rule very rapidly. He had a couple of instruments set up, and made alternate tests in the two for several weeks at odd times; and so far as the small variations of the calorific value which occurred would allow one to say, he could not say which was the higher. The two sets of values fitted in one with the other so well that he could not say, on the whole, which instrument gave the higher results. He had not used the new calorimeter for producer gas; but he thought there would be no great difficulty in applying it to such use. He had, with Mr. W. J. A. Butterfield's assistance, made tests with it with hydrogen burning at the rate of about 8 cubic feet per hour, and the results had appeared satisfactory; but the final gas-analysis to check the purity of the hydrogen used had unfortunately failed, and the test had not yet been repeated. He did not think an analysis of coal gas would be of much service in checking the accuracy of tests of that gas in the instrument. He was glad to hear Dr. Colman's remark about the absence of corrosion in the Jünkers calorimeter. He (Professor Boys) had happened to see the inside of one calorimeter, which was in a bad state; and he was horrified. The instrument on view (one of Professor Boys' own design) had been in use at one of the Metropolitan testing-stations for nearly a year; and it had simply been brushed out with a tooth-brush. The state of the instrument showed that corrosion to any practical extent had not occurred at all.

Professor Threlfall, in the course of his observations, remarked upon the gratification it was to him to have heard his work spoken of in the way it had been. It was a great encouragement.

SCOTTISH JUNIOR GAS ASSOCIATION.

Eastern District.

The members of the Eastern District Section of the Association attended in good numbers the quarterly meeting, which (as briefly mentioned last week) was held in the Heriot-Watt College, Edinburgh, on Saturday, the 2nd inst.

The PRESIDENT (Mr. W. Brown, of Lasswade), in opening the proceedings, said the members had arrived at their last quarterly meeting for the session. Looking back, he thought they had good reason to be proud of what they had done. The attendances had been encouraging; and he was sure no one would regret the time he had spent in connection with the Association.

GAS-GOVERNORS.

Mr. J. W. LILL (Edinburgh) read a paper on the above subject, illustrated by lantern slides.

At the outset, the author disclaimed all intention of presenting a paper upon any new invention, but would endeavour to give a description of a few of the governors used in regulating the pressure of gas in street mains. Before describing any particular type, he would consider a few points to be observed in the designs of these appliances; the chief being that all parts must work with the least amount of friction, and, as far as possible, the valves be in equilibrium at all parts of their travel. This was obtained by balancing the inlet pressure on the cone valve, which must be capable of adjusting itself to any variation of initial pressure due to the gasholder cupping or uncupping, or to being changed. It must be sensitive to any fluctuation in the consumption, and must automatically control the pressure predetermined by the manager. The advantages of a governor were many; for if the gas were stored in a holder and allowed to flow into the town main, the varying weights of the holder, by its partial immersion in water, and a consequent difference between the weight and specific gravity of iron of which it was composed, caused a considerable difference in pressure. Again, if they bore in mind the loss in the mains, there was a considerable advantage in reducing the pressure to a minimum, because whenever the pressure in the main exceeded that which was necessary, there was a loss to the supplier through increased leakage.

Mr. Lill then showed a sectional view of an old Milne governor wherein the gas, upon entering, passed round the cone valve, and away by the outlet; the weight of the valve and bell being counterbalanced by an air-pipe float fixed around the bottom of the bell. He explained that one special feature about the cone valve as now constructed was its parabolic shape, which was the result of careful calculation; the object to be attained being equal reduction of area during the entire travel of the valve. Formerly the cones were made straight. He next showed a diagram of a cone valve, 18 inches long and 12 inches in diameter, divided into twelve equal parts, the area being given for every 1½ inches of travel; and he pointed out that they had a reduction of area of 9·425 square inches.

The author reminded his audience that gas pressure is always spoken of in so many tenths of an inch, or, for high pressure, in inches, and the weight of water is such that a column 27·63 inches high is equal to 1 lb. per square inch. He stated that to find the weight required for any governor—say, for instance, one of about 20 inches diameter, the area of which was 314·16—divide by 27·63, and the answer will give 11·04; so that a weight of 11·04 lbs. gave 1 inch pressure. Any other weight could be arrived at by direct proportion. Reverting to the governor just described, he said one objection to it was that any sudden increase of pressure on the inlet made it oscillate, causing varying pressure on the outlet. To obviate this, several methods had been adopted. He showed one with the bell made in two compartments, the centre or smaller bell being equal to the area of the base of the cone valve, the inlet gas having the same area to pass in opposite directions, keeping the whole in perfect equilibrium. The outer compartment, having a connection to the outlet chamber by means of a small wrought-iron tube, allowed the bell to rise and fall, and with it the cone valve, as the consumption on the outlet varied. The bell was guided by means of two vertical columns, extended from the cast-iron tank upon which a bridge-piece was placed, a hole being bored in the centre to guide a rod rising from the top of the bell, and small pulleys being fixed on the bottom which engaged against the sides of the tank, thereby keeping the moving parts in a vertical line.

Mr. Lill next showed a type of governor arranged somewhat differently. It was known as Milne's compensating governor, being made up in two separate cast-iron tanks—one for the bell and the other containing the cone valve. He said the chief feature of this design was the easy access to the working parts, for periodical examination. The valve could be taken out without disturbing the bell. He then showed a Peebles governor, and said it was simple and of a compact nature, the ordinary cone valve being departed from. The valve-seat was a cylinder open at both ends, and around its circumference a series of small, and more or less conical, openings were formed. The valve was pyramidal in form, suspended by a rod from the roof of the bell. Messrs. Parkinson made a similar two-coned governor.

All the governors so far described had their pressures adjusted by weights. The author next showed a type known as Cowan's water-loading governor, in which they had still another valve arrangement, known as Key's patent valve, of cylindrical shape, closed in the bottom, and having a series of slots cut around its circumference, the gas passing through them. To load the bell, they opened the quadrant cock and allowed water to flow into the top chamber. This, in turn, overflowed the seal, and ran into the loading-tank. To lower the pressures, they opened a cock which allowed the syphon to draw the water off. This, in turn, had to be shut off when the minimum pressure had been reached. A governor, the invention of the late Mr. Foulis, which had of late sprung into great popularity among gas managers, was next shown. It differed very considerably from any described, inasmuch as the bell itself formed the cone or valve, and two cones were provided, so as to balance the effect of the inlet pressure. The whole being contained in a cast-iron case, the usual method of placing weights could not be adopted. A second bell was therefore provided, and was connected to the under side of the coned bell by means of a wrought-iron or lead tube, so that the pressure on the under side of the governor bell and that on the air bell were the same. Consequently, any loading placed on the bell, causing increased pressure upon it, was at once communicated through the tube to the other bell. This pressure was used to counteract the pressure upon the upper side of the coned bell, and thus any desired outlet pressure could be secured. But, further, to keep the coned bell from responding too rapidly to the pressure on the upper side, a plunger was connected to it in such a way that a liquid (usually glycerine) had to pass from the inside of the cylinder to the outside, or through a very small hole provided in the upper end of the cylinder. Another good feature was that, the whole governor being buoyed up by air, the coned part of the bell alone was subject to gas. The air or regulating bell could be placed in any convenient situation, and should the bell become damaged or the water-seal be blown away by excess of pressure, no escape of gas would ensue. Should the communicating-pipe between the two bells be broken, a very good arrangement had been designed to prevent the closing of the valve by the introduction of the air-tight float, placed around the bottom of the coned bell, set to the minimum pressure required, so that should the pipe be cut, the pressure would only drop to the minimum, and lights in the town would not be extinguished. This feature alone practically made the governor "foolproof."

In conclusion, the author said all the governors were dependent, more or less, for water to seal their working parts, and in winter, when the thermometer was often at or below freezing point, it was best to take some precaution to prevent the water from becoming ice. He showed a diagram worked from a table given by Messrs. Veitch and Wilson, and explained that if 10 per cent. of glycerine were mixed with water, it would freeze at 30° Fahr., and 20 per cent. at 27½° Fahr.; so that if they used 20 per cent. of glycerine with the water in the bell, the danger of freezing would be averted. The last governor shown was one used in high-pressure mains. It was of the Foulis type without the plunger; the seal for the coned bell being mercury.

SOME NOTES ON ELEVATORS AND CONVEYORS.

Mr. W. B. Leech, A.M.I.Mech.E. (Edinburgh), read a paper on the above subject, in the course of which he said:

I will deal with coal and coke elevators, and push-plate, steel belt, gravity bucket, and hot-coke conveyors. There are, of course, many other types suitable for handling gas-works materials; and it must not be thought, because I do not describe them, that they are of less importance. I do not touch the actual question of the cost of upkeep; but I give as far as possible my experience in reducing the wear and tear of this class of machinery.

It is very generally recognized that cased-in elevators are the most suitable for handling gas-works materials. With the lattice-braced elevator, there is more or less a constant spill from the buckets during the journey to the head. This, besides being dangerous to those at work or passing near, gives the surroundings an untidy appearance, and I have always found it extremely difficult under such circumstances to get the men to keep the plant in good order. Cased-in elevators, however, have disadvantages of their own—the chief being the difficulty of getting access to the moving parts, either for inspection or for repairs. This has been entirely overcome at Granton by a combination of the lattice-braced and cased-in types. The elevator shown in fig. 1 is used for lifting coal from the crusher-pit to the bunkers

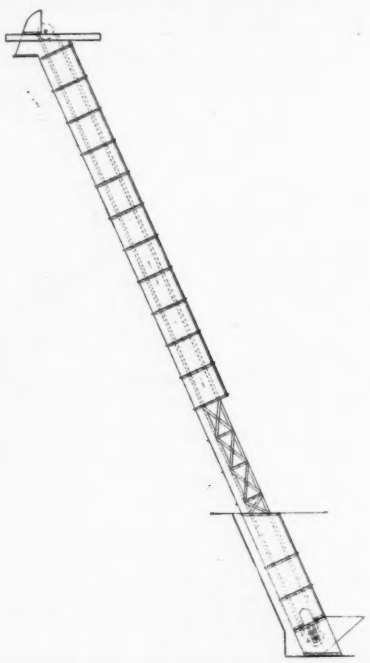


Fig. 1.—Lattice-Braced and Cased-In Elevator.

above the retort-benches. It will be noticed that from the ground level the frame is lattice-braced for a distance of about 18 feet up, the remainder being cased. This design has all the advantages of lattice-braced and cased-in elevators, with few of their disadvantages—that is to say, there is an easy access to all working parts, and a freedom from the continual spill of the material being handled. For twin elevators this design is of greater service, as it is very often necessary to overhaul one side while the other is running. I have found this to be practically impossible where the frame is lattice-braced. I have in mind an instance where two lattice-braced coal elevators were arranged side by side, and in this case it was quite impossible to overhaul either when the other was working; while if one were allowed to stand for two or three days, the boot and the buckets were filled with fine coal to such an extent that it was impossible to start the elevator until the coal in the boot had been removed by hand. Often the coal had also to be removed from the buckets before a start could be made. In the elevator boot there should be, in addition to the usual cleaning-out door below the bottom shaft, a door of sufficient size to allow for the removal of the trailing sprocket-wheels without taking down the feeding-shoot. Much trouble is caused by putting these wheels in the wrong way, it being often forgotten that the trailing wheels are the driven, and not the drivers. I have found, however, that, where the pattern of chain will permit, it is far better to discard sprockets and substitute in their place guides fixed to the sides of the wheels.

To the back of each bucket is attached a skidder-bar, the ends of which rest in the angle runners of the elevator frame, for the purpose of guiding the buckets in a direct line throughout the length of their travel. As will be expected, there is a great amount of wear on both the bar and the guides—so much so that it has been found necessary to line the latter with wearing strips to prevent the frame being permanently damaged. For elevators handling non-gritty material, these strips are generally made of hard wood. Care, however, must be taken that there are no square edges on the parts of the skidder-bars coming in contact with the wearing strips. I think hard-wood liners are more suitable for lattice-braced elevators; and even then they are not entirely satisfactory, as there is always the danger of their being torn up. Once let the skidder-bar grip, and you may safely count upon having to renew the whole length of the liner on that particular side. At Granton, the best results have been obtained from a special hard mixture cast-iron liner of about 2¼ in. by 1 in. cross section. These will be found, besides being very serviceable, remarkably cheap; and they are better when the iron is of that hard, brittle nature which iron-founders are often wont to supply, even when they are not asked to do so. These liners are cast in 5-feet lengths; the ends being bevelled in such a manner as to give the skidder a lead from one to another. They are attached to the angle runners by ⅜-inch taper bolts 2 feet pitch, and are mounted in their rough state. The ends of the skidders are protected by a cast-steel cap, as shown in fig. 2.

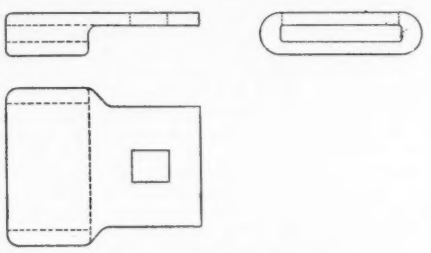


Fig. 2.—Skidder End Caps.

Referring to push-plate conveyors, I should like to mention the fact that, even after taking into consideration the difference of the angle, the wear and tear on the guides is much greater than on elevator guides. Taking the elevator, it will be readily understood that the weight of the bucket has a tendency to lift the nose or forward edge of the skidder-bar from the guides. (This happens on both forward and return chains.) There is no doubt that the layer of coal dust formed on the guides is greatly due to this fact. With push-plate conveyors, the weight of the load against the plate has the opposite effect, and tends to dig the nose of the skidder into the guides, causing it to act more as a scraper than a skidder. It is solely on this account that hard-wood liners are so unsuitable for push-plate conveyors. Take, for instance, a mild steel skidder-bar which is not protected by a cap. The section is (say) 3½ in. by ⅜ in. After a few months' run, the nose is worn away to a razor-like edge; and one can easily imagine what would happen to the hard-wood liners should by any means the push-plate be further tilted. Even with cast-iron liners, the skidder-bar cap should be from 1 to 1¼ inches thick, and the edges rounded off to the greatest radius. The push-plate conveyor referred to was mounted with cast-steel caps; but with a duplicate conveyor it has been found necessary to renew each year not only the cast-steel caps, but the cast-iron liners where the cross section of the former was only 3 in. by ½ in.

Returning to elevators, the method of attaching buckets to the chain is another point which has given much trouble, chiefly through the bolts working loose. To overcome this difficulty, many engineers use a bolt of sufficient length to allow several threads to project past the nut. After the nut is tightened, these threads are burred up. This, of course, prevents the nuts from slacking off; but should it be necessary at any time to remove the buckets, all bolts so treated would have to be cut out before this could be done. Other methods, perhaps slightly more expensive in the first place, are to use bolts provided with lock-nuts or drilled for split pins. A bolt with a very fine thread has been found to answer the purpose very satisfactorily. Cup-headed bolts with round necks are generally employed; but it would be better if the holes in the buckets were punched to suit square-necked bolts. A built-up mild-steel bucket is the best for handling coal; but for coke, ash, and similar materials, I think a stamped steel bucket would be found more serviceable, except, of course, in the case of continuous bucket elevators.

There are many good types of elevator chain; and I think the one most suitable for coal elevators is the roller. With this type of chain it is possible to use the ordinary sprocket-wheel in place of the hexagonal driving drum, which is objectionable in elevators, on account of the unsteady movement it imparts to the chain and buckets. The roller chain is made up of plain and attachment links, both of mild steel, connected together by a turned bolt, the nut of which is made secure by a split pin in the bolt. Between

the two plain links a mild steel roller is mounted, and this greatly reduces the friction when engaging with the sprockets of the driving and trailing wheels. The pitch of this style of link is usually about 9 inches. Riveted chains should certainly be avoided, as they are not safe. The riveted ends of the pins are very liable to break; and it is a most difficult chain to remove or repair. Elevators with buckets more than 15 inches wide are provided with two strands of chain. The pitch of the buckets is usually about 18 inches. The speed of the chain varies with the size of the elevator and the materials handled. A 30-inch coal-elevator should be set about 100 feet per minute; but a 12-inch elevator for oxide may be run as fast as 400 feet per minute. These speeds, I should say, are the extremes. Elevators may be set practically at any angle, from 35 to 90 degrees, provided that a suitable bucket is used. Below 35 degrees I think a steel-belt conveyor, with angle cross-bars, is more suitable.

Where duplicate plant is necessary as a safeguard against a complete stoppage through a breakdown or some other cause, the elevator frames are very often combined, and made to form what is known as a twin elevator. The reason for this is not one of economy, as it would at first seem; but, on account of the common inlet and outlet, it is necessary that the elevators should be as close to each other as possible. A deviation may be made from the general design of frame, which protects it from any wear and tear whatever, and makes it, one might almost say, everlasting. On account of the side play of the chain, the ends of the skidder-bars in time wear away the upturned flange of the angle runners.

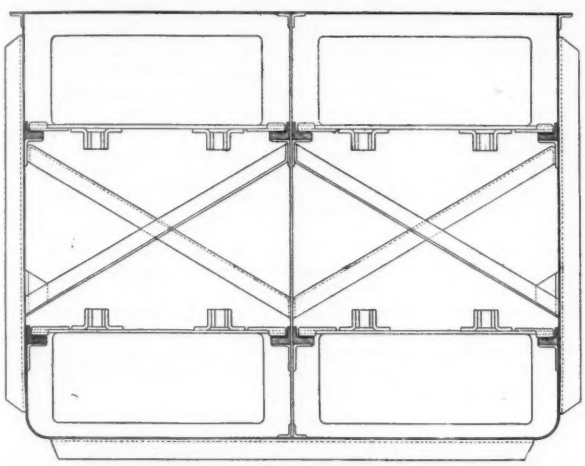


Fig. 3.—Inverted Angle Runners with Cast-Iron Liners.

With single elevators, these are not very difficult to renew; but in twin elevators the angle runners attached to either side of the division-plate are perforce riveted in such a manner that it is impossible to remove one without the other—thus necessitating the entire stoppage of both sides when renewals are to be made. This difficulty has been overcome by inverting the angle runners, and attaching to them cast-iron liners in the manner shown in fig. 3. The driving and trailing gear of twin elevators is arranged in such a manner that one side may be easily removed for repairs without interference with the other.

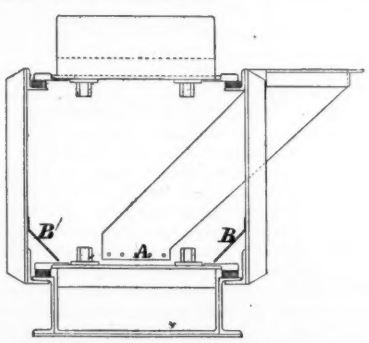


Fig. 4.—Push-Plate Coal Conveyor.

I think the most common type of coal-conveyor to be found in gas-works is what is known as the "push-plate" conveyor, a section of which is shown in fig. 4. This type is, without doubt, the simplest and one of the most efficient conveyors for handling coal. It requires practically no attention beyond the manipulation of the outlet-doors, which may be arranged at any suitable point and interval along the trough. It may be driven from either the inlet or the delivery end, and it is possible to set the outlet-doors in such a manner that the load will be divided and discharged at several points at the same time. The design of the feeding-shoot is a point of greater importance than it seems. The general idea, I think, is that this should be as wide as possible at the lower end, so as to ensure the coal being spread evenly across the full width of the trough. I have, however, found that for conveyors having two strands of chain, the shoot is sufficiently wide when made to deliver in between the strands. This prevents the coal from falling on to the chain and being carried to the far end of the conveyor, where it is crushed to powder by the end drums. By attaching a strip of leather at the point A, the skidder-bars can be kept perfectly clean. The guard-plates extend about 3 feet either way from the shoot, their purpose being to prevent the coal from splashing on to the cast-iron liners. The conveyor frame at this point is plated. By adopting this arrangement, the conveyor will work better and cleaner, and there will be less friction on the guides. As in the case of elevators, push-plate conveyors with troughs more than 15 inches wide are fitted with two strands of chain. The driving and trailing drums for this chain are hexagonal. The average speed of the chain is about 120 feet per minute.

The steel-belt conveyor is suitable for handling almost any kind of gas-works material. It belongs to what is known as the "carrier" type; the load being carried on a belt made up of a series of mild-steel bent or joggled plates, attached to the driving-chains in such a manner that each plate overlaps the preceding by 1 inch or 1½ inches. When dealing with ashes and clinker, the load should be delivered over the end of the conveyor; but coal and coke may be discharged at any point. This is generally done by V-shaped ploughs, which divert the load into shoots on either side of the conveyor. Stationary ploughs may be fixed at convenient points along the conveyor; but a better way is to mount the plough on a travelling bogie, which may be set to discharge the load where desired. To obtain a satisfactory delivery, the plough sides should be fixed at an angle of 20 degrees or thereabout to the line of travel. When set at too great an angle, they are always a fruitful source of trouble. When the load is delivered over the end of the conveyor, the top angle runners of the frame are upturned, and so form a guide for the belt; but when the conveyor is discharged by ploughs, the top runners are inverted, and guide-rollers fixed at intervals of 10 to 15 feet. The chain for this conveyor is generally of malleable cast iron or cast steel, and is run at a speed of 70 to 100 feet per minute.

The gravity bucket conveyor, in spite of its heavy initial cost, is gaining favour with many engineers. It is at present, however, rarely to be seen in gas-works. For the purpose of emptying the buckets, sets of tipping gear are fixed where necessary. These formerly consisted of two small rollers mounted on movable arms, which, when brought into position, engaged with cast-iron cams attached to either side of the buckets. This arrangement was objectionable, as the cams were released when the buckets were at right angles to their normal position; and so heavily did they fall back, that it would be some considerable time before they came to rest. Of course, with lipped buckets this system was impossible. One can readily imagine the continual clatter caused by these buckets falling back into position. It was not until after many failures that a satisfactory arrangement was found. It is shown in fig. 5. A triangular-shaped

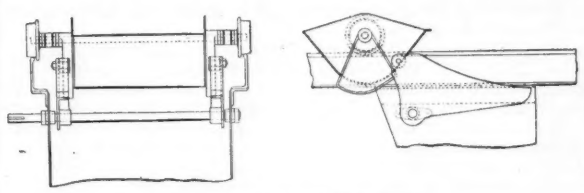


Fig. 5.—Gravity Bucket Conveyor.

guide-plate, provided with a roller for engaging with the cams, is mounted in such a manner that it can be put in or out of gear when desired. The cam, after leaving the roller, is steadied by the guide-plate until the bucket reaches its horizontal position. The lower portion of the cam was formerly similar in shape on both sides of its vertical centre line; but with these cams the guides were practically useless, no matter what their form might be, as after the buckets had once reached an angle of about 50 degrees they fell back to the horizontal with as much force as though there were no guides at all. The lower portion of the cam was then made eccentric in shape, with the greater radius towards the back of the bucket. This so steadied the buckets that they found their normal position, with their lips correctly set, without any noise whatever.

Of all materials, hot coke is the most difficult to deal with mechanically, as a conveyor for this purpose is exposed to the action of both fire and water. I think the chain suffers most at the point where the hot coke is quenched. The heavy rush of steam and water thrown up by it carries a large amount of dust into the working parts, no matter how well they may be protected. The wear and tear is consequently much greater than is the case with other conveyors; and on this account many engineers still prefer to wheel out their coke. I think, however, that this is a mistake, as the difference in the cost per ton of the two methods is sufficient to leave a handsome margin after the cost of upkeep and interest on capital have been paid.

There are many different designs of both the carrier and the drag-link type. In my opinion, the best of the carrier class is the grid conveyor, which consists of a belt of cast-steel or cast-iron perforated plates, mounted on flanged rollers, and running

in a mild-steel trough, so designed that the wearing parts are protected as much as possible. The coke is quenched as it is being carried to the delivery end; the waste water and coke dust fall through the perforations into the lower portions of the trough, and are taken by a push-plate, attached to the under side of the chain, to a point near the delivery end, where they are run off into a settling-tank. This conveyor requires very little power to drive it, and it does not break or over-quench the coke. Drag-like conveyors have a reputation for breaking coke; but I do not think they are quite so bad as they are made out to be. Provided with a suitable trough and chain, the coke should reach the delivery end in much the same condition as it entered the conveyor. Of this type, the now well-known De Brouwer hot-coke conveyor is the most common; but this has the disadvantage of having its chain covered by the load when at work, and consequently the wear and tear is somewhat heavy. A new type of hot-coke conveyor, designed by Mr. W. R. Herring, of Edinburgh, is giving excellent results. It is similar in action to the push-plate. The chain and the flanged rollers carrying it are arranged above the load, and are so protected by guard-plates that it is impossible for the coke to get anywhere near them. The rollers and pins are provided with renewable parts of chilled cast iron.*

One of the peculiarities of hot-coke conveyors is the expansion of the chain caused by the heat transmitted to it by the hot coke. Where no special arrangements are made to counterbalance this, after a few minutes' working under load the chain becomes so slack that it often jumps the sprockets of the driving-wheels. This calls to mind an incident which occurred at a Continental gas-works some years ago. A hot-coke conveyor, which had given every satisfaction during the first few days' run, commenced to slip the sprockets. The attendant rushed to the trailing end and tightened up the chain until the slipping ceased. Most likely he was pleased that he had been able to remedy the defect so easily; but he was very much puzzled when, an hour or so later, he discovered that the trailing end structure had been torn up from the foundations, and the driving end very badly damaged. This was caused by the contraction of the chain when cooling down. The expansion of the chain may be counteracted by having the trailing drums mounted on sliding blocks, provided with strong springs or weights to take up the slack. The simplest way, however, is to leave a gap, from 15 to 20 feet wide, in the return-chain guides, as near as possible to the driving-drums. The weight of the unsupported chain automatically takes up the slack.

Discussion.

The PRESIDENT asked Mr. Lill what the cost of 20 per cent. glycerine would be, and how long it would last.

Mr. J. MUNRO (Edinburgh), referring to the governor, mentioned by Mr. Lill, in which the pressure might go away without the lights extinguishing, asked, if the governor were in an isolated district, would there be no danger of the governor passing back to the inlet pressure?

Mr. SIMPSON (Dunfermline) asked if there ever was trouble with the air-chambers.

Mr. LILL replied that he would not think of using pure glycerine. There was a coarse, cheap kind, which was utilized by motorists in their cooling chambers. It would last for years. A float fixed in the bottom of an air-bell acted in the same way as a weight. If they had it fixed at (say) a minimum pressure of 15-10ths, they loaded the float at this, and let the pressure go above it. The moment they went beyond 18-10ths, back-pressure on the outlet-main forced down the governor. Parabolic valve governors had no air-chambers; they all worked with gas.

The PRESIDENT said the subject of governors was one which appealed to all who had anything to do with gas. In Lasswade they had one of the oldest governors; it was by Messrs. James Milne and Son. But he thought the day was not very far distant when they would have no need for these appliances. With gas fires, engines, and cookers in use during the day, and with lighting by night, they required all the pressure they could get. In one part of his district, he had had no governor in use for more than a year, and he had not found any disadvantage; nor did he think it had had any effect upon the leakage. They would soon need to be considering the advisability of supplying gas at a higher pressure than that which they had so far been in the habit of employing.

Mr. LILL asked Mr. Leech if he had ever used a slip-in link. He said he had never seen such a link used in coal or coke conveyors, but in those employed for other materials. These links were very handy in mending chains, as they saved bolts and wear and tear.

The PRESIDENT expressed a desire to know what would be the saving in cost, in using a hot-coke conveyor, as compared with a man wheeling away the coke, or other means of conveyance.

Mr. J. DICKSON (Kelty) asked what the percentage of breeze was in coke handled by conveyors, and before these were used. He said he could very well fancy that the crushing and the treatment the coke would get in a conveyor would be different from what it would be where it was tipped into bogies and landed in a bing, and so got very little handling. He did not think this method was so hard on the coke as the conveyor.

Mr. D. BISSET (Edinburgh) asked what would be the minimum size of a gas-works which could adopt elevators and conveyors. Could Mr. Leech give them any idea of the length of life of a conveyor lined with mild steel, compared with a cast-iron one. In the case of mild steel, he considered that the action of the heat and water would be stronger than with cast iron.

Mr. LEECH thought the link to which Mr. Lill had referred was made of malleable iron. It was used chiefly for outside work, for gearing, and not so much for elevators. It made a very good chain indeed. The cost of handling coke depended greatly on circumstances. At Granton, or in any works in which there was a large quantity of coke to be handled, the conditions were, of course, different from those in small works. He did not think breeze was made entirely by the conveyor, though it might be responsible to some extent. A general mistake was in the shoots, which were made sometimes to give the coke a drop which it could not stand when it was hot. Again, there were sometimes projections by which a great amount of dust was created. As to the size of works suitable for conveying plant, he had seen, at Lyons, six beds of horizontal retorts, he thought of sevens, and they had a coal and hot-coke conveyor. The retorts were fed by a charger. The whole of the coal was lifted by an elevator, and delivered on to the top chain—a very light pattern one—of a hot-coke conveyor; and the return chain took away the coke. The cost of such a conveyor would be very small; he should say not more than £500, or thereabout. Of course, the coke was not stored in a large heap, or screened. As regarded the lining of hot-coke conveyors, he intended to say that they were better with a mild steel trough, on account of the amount of expansion and the continual movement of the retort-bench. Wrought-iron troughs were very serviceable, but would not stand the wear and tear with coke; and therefore they must be lined with cast-iron wearing-plates. After some wearing, these became burnished, and the coke slid along them as it would upon glass. In a large place, they could not store coke by tipping it from bogies. He had seen abroad coke being taken out by men in buckets. At Granton this would cost them 10d. or 1s. per ton. In small works it might be done for 6d. per ton; but in large works a hot-coke conveyor, with screening plant, would take coke from the retorts and deliver it into the waggons, without being touched or handled in any way, at a cost of from ½d. to 1½d. per ton. There was a great deal of wear and tear in any hot-coke conveyor; but they could be relied upon now more than they could in former days. He knew of chains having been in use for about five years—of course, with parts renewed. One had been working at Granton for about eighteen months, and showed no signs of giving way.

On the motion of the PRESIDENT, the authors of the papers were thanked for their contributions.

* An illustrated description of the arrangement referred to appears on p. 681

SCOTTISH JUNIOR GAS ASSOCIATION.

Western District.

There was a large attendance of members of the Western District Section of the Association at their meeting last Saturday evening, which was held in the Glasgow and West of Scotland Technical College, Glasgow, under the presidency of Mr. James M'Leod. The President opened the proceedings by intimating that it had been arranged to have a special visit to the Provan Gas-Works, to close the session, on Saturday, the 6th of April; the works having been kindly thrown open to the members by the Corporation. After the inspection, there would be a social gathering. They were on the look-out for papers for next session, and already they had promises of two, which he considered was a good beginning. He then called upon Professor Thomas Gray, D.Sc., of the College, to give a lecture on "Flame Temperature." We are, however, unable to give it in the present issue of the "JOURNAL," as Dr. Gray is desirous of preparing a summary of it for publication, which he had been unable to do before the meeting. We can nevertheless give an indication of its scope. The lecturer said that, in addressing himself to a subject which had already been so ably covered by Professors Smithells and Lewes, he was afraid that he could say little that was new. He submitted and explained a series of tables giving the molecular and calorific value of hydrogen, methane, ethylene, benzene, and carbon monoxide, went on to deal with their specific heats, and then took up the subject of the flame temperature of coal gas burning in air, which he said was a good deal more complicated. He showed, again by tables, the oxygen required to burn the various gases composing coal gas, the thermal capacities on combustion, at various temperatures, and illustrated by experiment the method of measuring the temperatures of gas-flames by means of the galvanometer and platinum wire arrangement. He dwelt upon the deteriorating effect which an excess of air has upon the temperature of flame—emphasizing the point that the same coal gas, consumed with different burners and with varying air supplies, gives different temperatures, and that it is necessary, in order to have complete combustion and the highest possible temperature, to have an exact proportion of gas and air, and to have them properly mixed. The maximum temperature attained from coal gas, he concluded, was about 1780° C. As Dr. Gray had intimated his willingness to reply to questions on the subject he had dealt with, several were put to him and answered; and he was cordially thanked for his interesting lecture, the summary of which will be given in a subsequent number.

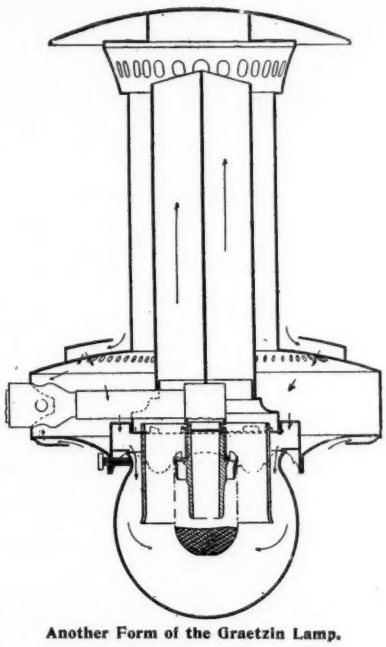
REGISTER OF PATENTS.

Lamps with Inverted Incandescent Burners.

GRAETZ, M., of Berlin.

No. 3759; Feb. 15, 1906.

This is another form of the Graetzin gas-lamp; the patentee's object being "to efficiently protect the burners from atmospheric air draughts and to arrange the bunsen burner of the lamps in such a manner that the air supply is steady and unaffected by atmospheric air draughts, thereby providing a steadier light than hitherto and prolonging the life of the mantle."



Another Form of the Graetzin Lamp.

The mantle is surrounded by a transparent tube or cylinder, which is, by its upper end, connected to a tube divided in two parts by a partition-wall. The cylinder is surrounded by a closed globe carried by the lamp casing; the joint between them being airtight. The currents of air are thus drawn in as indicated by the arrows.

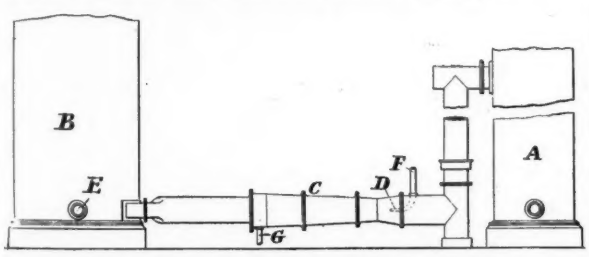
The primary air for the burner is protected against the currents of atmospheric air by the casing, which also shields the currents of secondary air, which also move in the direction of the arrows to the mantle. The combustion gases enter into the upper space of the casing, and thereby maintain a continuous current of air in an upward direction, and so influence the current of atmospheric air that "a very uniform burning of the bunsen flame in the globe is obtained."

Withdrawing Gases from Retorts, &c.

BIEMANN, W., of Bishop Auckland.

No. 4001; Feb. 17, 1906.

This invention for withdrawing gases from gas-retorts or coke-ovens consists in the combination of a water-injector introduced into the gas-main between the condenser and the scrubber and a pump, which continuously circulates ammoniacal liquor through the injector. The injector thus forms a substitute for the exhauster generally used.



Biemann's Plant for Withdrawing Gas from Retorts.

The invention represents a gas-main leading from a condenser A to a scrubber B. The portion of the main marked C is constructed like the outer tube of a water-injector, and in it is fixed a nozzle D for delivering water in the form of spray. The ammoniacal liquor from the scrubber drains by the pipe E into a tank, from which (at the start) some of it is supplied under pressure by a pump to be fed to the injection-nozzle D through the pipe F. The ammoniacal liquor thus spraying into the main, drains away by the pipe G to a tank, in a more concentrated condition than when it left the scrubber. It is then supplied to the pump instead of the liquor from the scrubber, and is again passed through the injector-nozzle, and so on, until it is no longer capable of exerting useful scrubbing action.

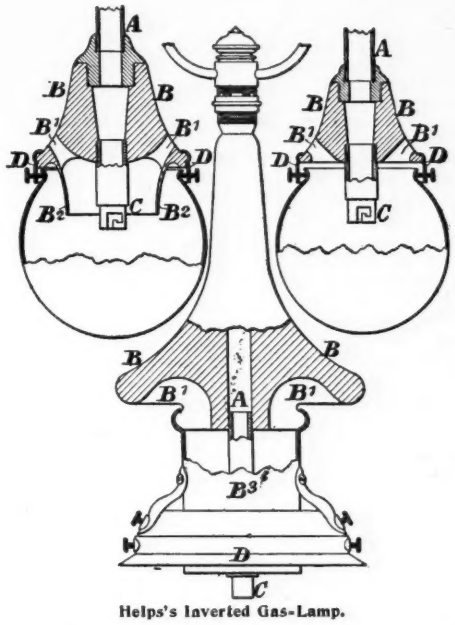
An injector used in this manner, the patentee remarks, not only scrubs the ammonia from the gas, but extracts the tar.

Inverted Gas-Lamps.

HELPS, GEORGE, of Nuneaton.

No. 10,621; May 7, 1905.

The patentee proposes, in an incandescent gas-burner, the combination with a heat-diffuser (of china or other refractory material) and globe-carrier, secured to the gas-pipe, and forming a continuation of it, of passages formed in the body of the diffuser for carrying away the products of combustion, and a burner-nozzle secured to the heat-diffuser.



Helps's Inverted Gas-Lamp.

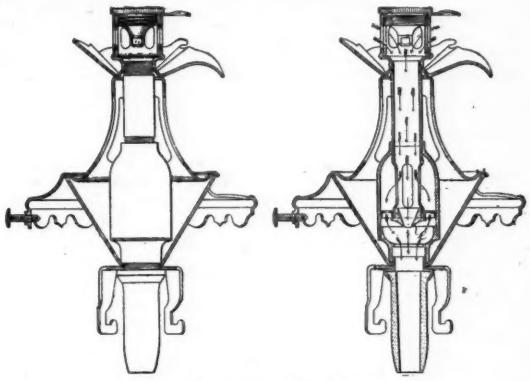
The illustrations show a section of a heat-diffuser and globe-carrier suitable for use with a globe in which no air holes are provided in the globe; a heat-diffuser and globe-carrier suitable for use with a globe provided with holes for the inlet of air; and a section of an arrangement similar to the first one, but in which the portion carrying the globe is not made in one piece with the heat-diffuser, but is merely attached to it.

Inverted Incandescent Gas-Burners.

WRIGHT, J. W. B., and DARWIN, H., of Birmingham.

No. 12,644; May 31, 1906.

This invention has for its object to provide an improved construction of inverted burner whereby the mixture of gas and air is thoroughly incorporated, and is, by virtue of the injector-like action of the device, supplied to the point of ignition under increased pressure.



Wright and Darwin's Inverted Burner.

As shown, the burner is provided with two superimposed mixing-chambers, the upper of which is in communication with the gas-and-air supply fitting, while the other communicates directly with the outlet leading to the ignition-tube of the burner. The mixture produced within these chambers is delivered under pressure to the ignition-tube by the injector-like action set up by a jet of mixture projected at a comparatively high velocity from a nozzle at the lower end of the central supply or induction tube and passed through the lower mixing-chamber to the ignition-tube. It carries with it the mixture from the chamber, and thereby delivers it under pressure to the point of ignition.

The central supply or induction tube (which depends from the ordinary regulator fitting, and whereby the gas and a regulated amount of air are admitted into the burner) has attached to it a continuation or extension sleeve formed with a series of vertical slots or openings, whereby the tube is placed in free communication with the upper mixing-chamber and terminates in an injector-nozzle or throttled outlet, whose restricted passage is presented to the mouth of the ignition-tube

so that the stream or jet of mixture issuing from it is projected directly into the ignition-tube. This upper mixing-chamber may be formed by a domed or inverted cup-like attachment secured to, and suspended from, the central supply tube at about its junction with the slotted extension sleeve; and the attachment carries in its turn a cup-like or dished element, which surrounds the injector-nozzle of the central sleeve and constitutes the secondary mixing-chamber. The secondary mixing-chamber is partitioned off from the top chamber by a grid-like or perforated plate or diaphragm whereby the mixture drawn from the one chamber to the other is "thoroughly pulverized and incorporated" before being carried by the injector jet from the central nozzle into the ignition-tube suspended from the bottom of the secondary chamber in such a position that its upper end comes in a lower plane than, but concentric with, the injector-nozzle.

With such an arrangement, the initial mixture supplied to the upper mixing-chamber through the slots or openings in the extension of the central induction tube, and the "pulverized and intimately incorporated" mixture in the lower chamber, are always subjected to the pull or suction of the injector jet from the nozzle which lies within the middle of the lower chamber; and thus the completed mixture is delivered to the ignition-tube at a high velocity and at an enhanced pressure, which is said to ensure "a maximum of illuminating efficiency being obtained with a minimum quantity of gas when the mixture is burnt in contact with an incandescent mantle."

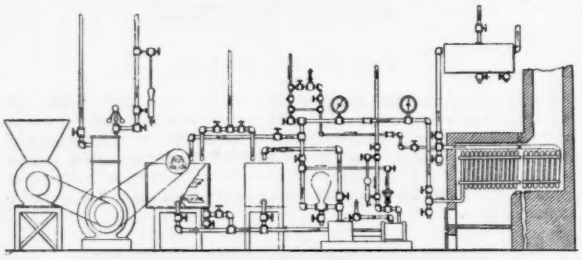
Manufacturing Gas.

COHEN, P. I., of New York.

No. 16,600; July 23, 1906.

This invention relates to the manufacture of illuminating and heating gas from hydrocarbon oil, or an emulsion of oil and water, or a semi-liquid emulsion containing oil, peat, and water, or other suitable ingredients.

The object of the invention is to provide for rapidly and economically generating high candle power gas—40 to 60 candle power—at a single operation, by forcing hydrocarbon oil under a constantly maintained and automatically controlled pressure through coils of pipe, heated to a temperature at, or above, the degree at which gasification is effected, or to make gas of lower candle-power for heating purposes and motive power in gas-engines by forcing a mixture of oil and water, or oil, water, and ground peat under like conditions through heated coils.



Cohen's Oil-Gas Plant.

Another object of the invention is to provide an apparatus which is "simple" in construction and operation, and which is adapted for rapidly and economically generating gas, at a single operation, by forcing such liquid or semi-liquid, under a maintained and automatically controlled pressure, through heated coils or conduits, kept at the proper temperature for making fixed gas.

A special object of the invention is said to be to provide for automatically and constantly controlling the pressure in the liquid supply pipe and generating coil, so that the pressure in the coil shall be substantially uniform and of the proper degree to permit the gas-yielding material to be converted into fixed gas while being passed through the coil or conduit, "whereby a uniform quality of fixed gas is made without undue strain or injury to the apparatus."

Street-Lamps.

ABRAHAM, A., of Berlin.

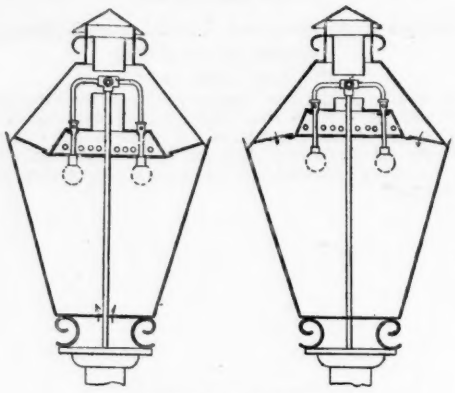
No. 25,300; Nov. 9, 1906.

This invention relates to means for converting ordinary street gas-lamps into lamps adapted for use with inverted incandescent burners "by placing within the lamp a sleeve-like casing abutting against or terminating in the reflector, the mixing-tube of the burner having its air-nozzle outside the casing and the latter having a central outlet pipe for waste gases."

The illustration shows a lamp in which the air supply takes place partially from the bottom, and another in which the air supply is entirely from the top.

At or about the height of the reflector, a sleeve-like casing is arranged, through which the inverted burners are passed and connected to the gas-supply pipe. The casing consists of a truncated conical shape closed at the top and terminating in a central chimney. At the bottom it is closed by a plate somewhat extended laterally so that it offers a support for the reflector, which bears loosely on the support; so that it may be used with its concave or convex side, according to the purpose of the lamp. The inverted burners are passed through the casing so that the air-supply nozzles are outside the latter; whereas the burner-heads and incandescent bodies pass through comparatively wide apertures in the bottom plate.

When a partial air-supply takes place from below, outside air is conducted to the burners directly from below; whereas other air is supplied from a chamber formed, on the one hand, by the cover of the lamp-roof, and, on the other hand, by the reflector and casing. The gases of combustion are, however, compelled to ascend through the apertures in the bottom plate and pass out through the central pipe to the lamp ventilator. When, however, the air is supplied only from above, the reflector is provided with a series of apertures through which exterior air is drawn into the interior of the lamp



Abraham's Street-Lamps.

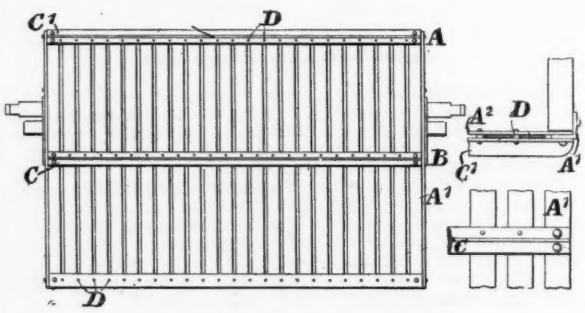
when the burners are ignited, and an upwardly directed current of gases of combustion is set up. In both constructions, the casing may with advantage be provided with openings arranged about the base of the conical wall.

Barrows or Trucks for Carrying Hot Coke.

BELTON, J. C., of Chester.

No. 26,360; Nov. 21, 1906.

Iron barrows, trucks, and the like, for carrying hot coke, &c., are usually constructed of a number of iron bars or plates rigidly held in a framework by rivets, and liable to bulging or buckling. This objection is intended to be overcome by the patentee so securing the bars plates as to allow of their free expansion or contraction—in the case of bars, by fixing them at one end while the other end is free, or by leaving both ends free and fixing the bars in the centre or at some other convenient point intermediate thereof; and in the case of plates, by forming in each plate two or more slots, engaging fixed pins or rivets, on which the plate can move.



Belton's Coke-Barrow Arrangement.

The patentee illustrates an iron tipping truck or skip such as is used for the conveyance of hot coke from the retorts in a gas-works to the coke yard. The enlarged details show in plan the corner A, and in side elevation a portion of the part B.

It will be seen that while all the bars are riveted to the T-iron C, only the flanged end piece A^1 is riveted to the T-iron C^1 and to the bottom of the framework. All the bars are merely spaced apart at the top and bottom by distance-pieces D. The bars are thus free to move, in their expansion and contraction, between the parts C^1 and A^2.

APPLICATIONS FOR LETTERS PATENT.

4535.—HINTON, E., and ANDREWS, F. A., "Bye-pass gas-cocks." Feb. 25.
4708.—SOCIÉTÉ ANONYME JOHN COCKERILL, "Gas-engines." Feb. 26.
4740.—BOUVIER, A., "Compressing gas." Feb. 26.
4758.—DAVIS H., and PEARCE. H. J., "Gas-fittings," Feb. 27.
4806.—BARBOUR, W., "Incandescent burners." Feb. 27.
4898.—ROLLIN, C., "Refractory blocks for gas-turbines." Feb. 28.
4911.—VILAR, H. DE, "Gas-generators." Feb. 28.
5060.—BLAKEY, J. W., "Gas and air burners." March 2.
5086.—WRIGHT, J. W. B., and DARWIN, H., "Inverted lamps." March 2.
5108.—COX, W., STAPLES, W., and GEORGE GLOVER AND CO., LTD., "Prepayment apparatus for delivering gas and like fluids." March 2.
5135.—GALILÉ, J., "Incandescent burners." March 2.
5137.—BROCKE, F., "Regenerative furnaces." March 2.

According to the "Daily Telegraph," Professor Poe, of Norfolk County, Virginia, has perfected an apparatus which will bring the apparently dead to life, and has secured a capital of £20,000 for an organization to exploit his discovery. This apparatus restores vitality by pumping carbonic gas from, and oxygen into, the lungs. Cases of apparent asphyxiation by gas, drowning, or death from overdose of anæsthetics, Professor Poe says, can be brought back to life that would otherwise be lost.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by our Correspondents.*]

High and Low Grade Gas.

Sir,—It is often said that, in all matters of controversy, the Editor's decision shall be final. Unfortunately, I am about to commit the unpardonable offence of denying that we have arrived at that stage where a decision can be final on the question of High *v.* Low Grade Gas.

All published results that I have hitherto had the privilege of perusing have violated almost every principle necessary to arrive at reliable comparative results. I trust, Sir, you will not look upon this letter as a serious form of "sacrilege" on my part for daring to dispute the correctness of the opinions of "representative progressive men" who have given their verdict on this question. I notice, to use military parlance, that at Manchester the opponents of high-grade gas were occupied most of the time in shelling the woods; the fort was never touched. You will perhaps agree with me, that the shells would make quite as much noise; but the ultimate effect hardly warranted the reckless waste of ammunition.

With your permission I propose to show that, in order to make comparative tests, it is necessary to consider causes that have certainly been neglected—if not quite ignored—up to the present time.

We will assume (and it is within the realm of possibility) that we are making gas consecutively of 20, 16, and 10 candle power, and consuming it in an ordinary incandescent burner at 2 inches pressure. Does it not at once appeal to you that it could not be the correct pressure for the three gases; for this reason, whatever the velocity of the gas on leaving the nipple and discharging into the mixing-chamber of the burner, that will determine the amount of air that will be drawn in through the air-inlets by the gas? If the quantity was correct for 20-candle gas, it could not be the right proportion for the other two, and *vice versâ*.

It can easily have happened in the case of Mr. Allen's tests that the pressure was more favourable to the 16 than to the 20 candle gas, which will account for the very slight difference in illuminating and calorific power.

Summing the matter up as briefly as possible, we obtain the following: "From a consumer's standpoint, that gas is the best which requires the largest volume of air, with the least volume of gas, for its perfect combustion." I need not labour the point that, the richer the gas, the more air proportionately will be required for its combustion.

Turning to the second phase of the question—*i.e.*, the manufacture of gases of varied grades—there are certain conditions that must be observed if reliable results are to be obtained. I take it that if a coal will produce a gas of 16 candles, without having to force its way through a seal or depend upon the action of an exhauster, 16 candles is the commercial illuminating power of that gas. Now to raise it to 20 candles by means of carburetted water gas we may get the candle power on the photometer, but will the constituents of the 20-candle gas produce the same proportionate results in an incandescent burner as the 16-candle gas direct from the coal? I am certainly of opinion that it would not, but am not in a position to make a thorough test.

Again to reduce the natural candle power of a gas by drawing from the retorts, you know very well that the composition of that gas does not bear any true proportion to the former. So to compare gases under the conditions usually adopted, cannot give us the results that we seek. It is perhaps as well to follow out the good old custom in regard to gas making that is usually followed by the judicious toper who says, "Never mix your drinks." If we want reliable comparative results, we must not "mix our gases."

Barnoldswick, March 9, 1907. J. W. Thompson.

[Our correspondent's letter has the appearance of having been written with all seriousness, and must therefore be treated in like manner. First of all, it may be said we give welcome to the communication because we have not arrived at that autocratic state when we arrogate to ourselves the right to final decision in matters of controversy; and therefore Mr. Thompson may be acquitted of any "unpardonable offence"' in denying that we have attained that stage when a decision can be final on the question of "High *v.* Low Grade Gas." Mr. Allen suggests that in Liverpool they have done so; most of the speakers at the Manchester meeting claim to have done so; expert opinion in Glasgow and Edinburgh is in favour of the down-grade in respect of illuminating power; the same in most other parts of the country; while the movement and experience in London and the suburbs give endorsement. If we except a few isolated units of the gas profession, there has already been final decision as to whether the future of gas supply must be on the lines of high or low grade illuminating gas, and judgment is favourable to the latter. We wish the remainder of Mr. Thompson's letter had been a little more explicit. The question of High *v.* Low Grade Illuminating Gas does not concern incandescent burners alone; it concerns the whole range of uses to which gas is applied. In short, it is a question as to the gas that is most economically suitable for all general purposes. In dealing with gas pressures for different qualities of gas, our correspondent does not extend consideration to the power of regulation at the gas-tap, by the air-collar on the burner, and by the means of gas control that some of the burner makers are providing. If Mr. Thompson has read Mr. Allen's paper attentively, he will discover that that gentleman in his tests, by adopting a fixed rate of gas consumption for the different qualities of gas, went quite athwart our correspondent's notions as to the proprieties in method in making comparative tests. It is, of course, accepted that the combination of carburetted water gas with coal gas does lower the average calorific value of the gas. Mr. Thompson is of opinion that 20-candle gas composed of an admixture of coal and water gas will not give the same proportionate results in an incandescent burner as 16-candle gas direct from coal. As Mr. Allen uses a fairly large proportion of carburetted water gas at Liverpool, we need not further pursue our correspondent's argument, seeing that, from the foregoing statement may be deduced the admission that Mr. Allen's paper and tests supply nothing that can assist our correspondent to any "final decision" on the main question. The determination of the policy of supplying lower illuminating power gas than hitherto has not been reached without a large amount of research on the way.—Ed. J. G. L.]

Examinations in "Gas Distribution."

Sir,—From your report of the recent meeting of the members of the Midland Junior Gas Association, I notice that (in conjunction with other Junior Gas Associations) they propose to approach the City and Guilds of London Institute with regard to examinations in "Gas Distribution."

I may state that such a proposal has already received the consideration of the Council of the Institution of Gas Engineers; and that the consent of the City and Guilds of London Institute to the suggested new examinations has just been communicated.

The title of the new examinations will be "Gas Supply," a draft of the syllabuses of which, recommended by the Council of the Institution, is now receiving the consideration of the Board.

39, *Victoria Street, S.W.*, Walter T. Dunn, Secretary.
March 7, 1907.

Mr. Brackenbury on the Prevention of Corruption Act.

Sir,—In reading over the "Journal" account of my "Prevention of Corruption" paper, I see on p. 616 (four lines from the top of the first column) the word "first" has been used in mistake for "third," which I think you will find in my MS. It relates to the four possible interpretations of the phrase "with intent to;" and it is the third (not the first) of the meanings that I should be made to say was "the most consonant with common sense." Further, as mentioned in my paper, there is judicial authority for the third meaning—see the extract from Bowen, L.J., given in the MS.

As this is rather important, I should be glad if you would rectify the mistake. The "intent" need not be the "sole" intent, but must be the "dominant" intent.

March 7, 1907. C. E. Brackenbury.

The Cerofirm Mantle.

Sir,—I have received a letter this morning from the holder of the option for the British patent in connection with the Cerofirm mantle, and learn that as soon as the Company is registered, and the factory is ready to turn the mantles out, it will be put on the British market. I am writing thus in order to correct a statement which I made in my address before the Midland Association of Gas Managers, to the effect that, owing to certain patent rights, this mantle cannot yet be put on the British market. This information was obtained from a source which I believed to be reliable.

Stafford, March 8, 1907. Hubert Pooley.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read a second time and committed: Colne Valley Water Bill, Great Yarmouth Water-Works and Lowestoft Water and Gas Bill, Portishead District Water Bill.

The opposition to the Devonport Corporation Bill, Heywood and Middleton Water Board Bill, and Newquay and District Water Bill has been withdrawn.

HOUSE OF COMMONS.

Thursday, March 7.

THE SUPPLY OF WATER GAS.

Mr. Remnant (in the absence of Mr. Harmood Banner, who had intended to carry into effect the recommendations of the Departmental put the question on the paper) asked the Home Secretary whether he Committee to control the supply of "poisonous gas" for heating and lighting purposes which does not possess a distinct and pungent smell.

Mr. Lloyd-George: It is presumed that the question of the honourable member refers to the Departmental Committee appointed by the Home Office in 1898 to inquire into the manufacture and use of water gas and other gases containing a large proportion of carbonic oxide. It is not my intention, as at present advised, to introduce a Bill on this subject. I may add that the Board of Trade are not aware that any gas which does not possess a distinct and pungent smell is used for heating and lighting purposes; and all the gas used for these purposes in the United Kingdom, whether coal gas alone or in admixture with water gas, is more or less poisonous.

The following further progress has been made with Bills:—

Bills read a second time and committed: Gas Companies (Removal of Sulphur Restrictions) Bill, Mitcham and Wimbledon District Gas Bill, Worthing Gas Bill.

The Select Committee on Standing Orders have reported that the

parties promoting the Boston Spa Gas Bill should be permitted to proceed. The Bill has accordingly been presented and read the first time. The Committee have also reported that the Burnley Corporation should be allowed to deposit a petition for a Bill.

The Armagh Urban District Council Bill, Llandrindod Wells Gas Bill, Mitcham and Wimbledon District Gas Bill, and Skanklin Gas Bill have been referred to a Select Committee, consisting of Sir Frederick Banbury (Chairman), Mr. Fiennes, Mr. Raphael, and Mr. Walter Hudson; to meet to-day.

The Falmouth Gas Bill, Maidstone Gas Bill, and Worthing Gas Bill have been referred to a Select Committee, consisting of Mr. Hutton, Mr. G. A. Gibbs, Mr. Agnew, and Mr. John Johnson; to meet to-morrow.

MITCHAM AND WIMBLEDON DISTRICT GAS BILL.

Court of Referees.—Tuesday, March 5.

The Court of Referees of the House of Commons, presided over by Mr. EMMOTT, the Chairman of Committees, considered to-day the claims of the Croydon Rural District Council and of the Mayor, Aldermen, and Burgesses of Wimbledon to be heard in opposition to the Mitcham and Wimbledon District Gas Bill.

Mr. LEES, the Parliamentary Agent for the two Local Authorities, said that in each case the only portion of the petition objected to was paragraph 16, in which it was submitted that further protection should be afforded them in relation to the breaking-up of streets and roads, to the depth at which the pipes of the Company should be laid, and to their sewers and mains. The Company were incorporated in 1867, and were granted a Provisional Order in 1892. The capital thus obtained was exhausted; and power was now sought to raise an additional £400,000, to reduce the illuminating power of the gas, to buy lands for further works, and so forth. With the new capital extended mains would be laid throughout the districts of the two petitioning Authorities. The character of these districts had absolutely changed in the last forty years; and the two Authorities therefore asked for further protection. They alleged that the Bill related to the lighting of their areas, and that they might be injuriously affected by it, and that they were entitled, therefore, under Standing Order 134a, to absolute *locus standi*. He suggested also that under this Standing Order it was not competent for the Court to cut down the *locus* in any way.

Sir CHANDOS LEIGH (Speaker's Council): You say you come under the mandatory Standing Order?

Mr. LEES: Yes. The Standing Order says "shall be entitled to be heard."

Sir CHANDOS LEIGH: Our hands have always been a good deal tied by this Standing Order. In face of what Mr. Lees has said, I do not see how the promoters can get out of it.

Mr. LEES, continuing, asserted that the Standing Order, in the conditions it contemplated and which were here complied with, gave *locus* against "the Bill," not against a particular clause. It was absolutely necessary that the Local Authorities should have some control of the depth at which the pipes were to be laid, and so forth. Such protection had been given recently in the Hitchin Gas Bill to the County Council of Hertfordshire.

Mr. HUTCHINSON, on behalf of the promoters, said this was an astute, but transparent, attempt to review past legislation. The petitioners did not object to any portion of the Bill, but to the breaking-up of streets. The Company had power, under the Act of 1867, to break-up streets and lay pipes, subject to the provisions of the Gas-Works Clauses Acts; and the Bill did not propose to deal with that power in any way. Yet the petitioners said: "Allow us to go before the Committee on merits to show that provisions contained in the Act of 1867 should be amended or repealed." The proposition was monstrous. The Court had consistently held that no attempt could be made by a petitioner to review past legislation. The Standing Order referred to did not say that every authority alleging injurious affection should be heard against the whole of the Bill. If a Bill dealt with a number of matters and referred incidentally to lighting, surely it could not be contended that the local authority, because of the reference to lighting, would have a right to appear against the whole Bill?

Sir CHANDOS LEIGH: Have you any case under this Standing Order where we have allowed *locus*, but had limited it?

Mr. HUTCHINSON replied that he had not. Continuing, he said he wanted the Court to distinguish between the provisions of a Bill which came strictly within the meaning of the Standing Order—namely, provisions relating to lighting—and other provisions contained, not in the Bill, but in a previous Act which the petitioners thought should be amended.

The CHAIRMAN: You are taking powers in this Bill for a large amount of capital, some of which will (we may fairly assume) be used for laying mains.

Mr. HUTCHINSON: Yes; but I can lay mains without that capital.

The CHAIRMAN: Under what powers will you lay these mains?

Mr. HUTCHINSON: Under the Act of 1867, not under this Bill. There is no power in this Bill to lay additional mains.

The CHAIRMAN: Do you desire to differentiate between mains to be laid out of this £400,000 and those that have been laid during past years?

Mr. HUTCHINSON replied that he did not. Continuing, he said that if the Company chose to manage their undertaking in a particular way—a way that was lawful—they could lay further mains without coming to Parliament. If the shareholders, in order to evade such a monstrous proposition as had been put forward, chose, they could devote the whole of the profits to the laying of fresh mains.

The CHAIRMAN: We have to take it as it is.

Mr. HUTCHINSON: Certainly; and you have to look at the petition as it is. There are only two clauses in the Bill which specifically affect roads. I concede their *locus standi* against those.

Further discussion having taken place, the Court allowed the general *locus* asked for.

LEGAL INTELLIGENCE.

COUNTY OF LONDON QUARTER SESSIONS.

Clerkenwell, Thursday, Feb. 28.

(*Before Mr.* ROBERT WALLACE, K.C., *Chairman, and a Bench of Magistrates.*)

The South Metropolitan Gas Company's Assessment.

At the Sessions House, Clerkenwell, to-day, the hearing was commenced of an appeal by the South Metropolitan Gas Company against the assessment of their undertaking by the Assessment Committees of the Woolwich Union, the Greenwich Union, the Borough of Lewisham, and the Borough of Bermondsey. At the conclusion of the third day's proceedings, the further hearing was (as briefly recorded in the "JOURNAL" last week) adjourned *sine die*.

Mr. BALFOUR BROWNE, K.C., Mr. DANCKWERTS, K.C., and Mr. W. C. RYDE (instructed by Messrs. Budd, Johnson, and Jecks) appeared for the Company. The Counsel for the respondents were: For the Woolwich Union, Mr. CRIPPS, K.C., Mr. HORACE AVORY, K.C., and Mr. E. W. COX-SINCLAIR (instructed by Mr. E. W. Sampson). For the Greenwich Union, Sir RALPH LITTLER, K.C., Mr. MARSHALL, K.C., and Mr. R. C. GLENN (instructed by Messrs. Saw and Sons). For the Borough of Lewisham, Sir EDWARD BOYLE, K.C., and Mr. TYRRELL T. PAINE (instructed by Messrs. Newton, Lewin, and Levett). For the Borough of Bermondsey, Mr. HORACE AVORY, K.C., and Mr. R. W. HARPER (instructed by Mr. F. Ryall, the Town Clerk).

Mr. BALFOUR BROWNE, in opening the case for the Company, pointed out that they were appealing in regard to eleven parishes in four Unions. As the points to be raised would be in each instance very much the same, he suggested that the whole matter should be gone into in connection with the first case—that of Woolwich—so that there should not be four sets of opening speeches and four cross-examinations of the witnesses. The first case substantially covered all the points that were really going to be discussed; but it was not, of ccurse, a consolidated appeal. Continuing, he explained that, under the Parochial Assessment Act, what had to be arrived at was the rent which might reasonably be expected from a tenant from year to year; and then they had to deduct therefrom the amounts that were necessary for insurance and other things to maintain the hereditament in a condition to command this rent. In the case of a gas-works—and more especially a large undertaking like the one in question—it was almost impossible to arrive directly at the rent which might be expected; and therefore it was necessary to proceed by another method to see, in fact, what it would be worth while for a tenant to pay for the hereditament. The first step was to take the gross receipts, which, in addition to the sales of gas, should include the rental from the meters (which had been held to be part of what a tenant of a gas undertaking would have to provide), and also, he argued, stoves and fittings. The total gross receipts from the four items he had mentioned came to £1,354,312; and from this had to be deducted bad debts, which, in the account year—the twelve months ending June, 1905—came to £3430, leaving a balance of £1,350,882. Turning to the tenant's expenditure, the most important item was, of course, coal, oil, &c., which came to £650,383 for the year. Then there was purification, £42,651—making a total of £693,034. But against the coal had to be put the receipts for residual products, which for the year named were £506,988, making the net cost of coal and purifying materials £186,046. Of course, there were other items—the largest being carbonizing wages £121,190—about which there could not be any dispute, as they appeared in the Company's accounts; but there were some figures on which the witnesses did not agree. A sum of £42,092 appeared under the co-partnership scheme; and this was clearly wages—it was the profit shared with the employees. Repairing and renewing fittings—5 per cent. on £345,938—£17,897, was a matter he would have to explain afterwards. Tenant's maintenance was put at £71,403; and altogether the working expenses came to £656,537, after deducting the £506,988 for residuals. Rates and taxes over the whole undertaking amounted to 7s. 11½d. in the pound, which came to £64,085—thus making a total expenditure of £720,622. Now he came to one of the matters which was really in dispute—tenant's capital. A tenant would require a certain amount of money in hand to go on with; and his contention was that the sum so needed would be five months' working expenses. To arrive at what this would amount to, they would have to take the £656,537 he had mentioned, and add the receipts from residuals £506,988, and the £64,000 for rates and taxes. This gave a total of £1,227,525 for the year, five-twelfths of which would be £511,469. It would not, however, be fair to take this figure alone; they must consider what would be coming in from residuals. He calculated there would be in hand four months' residual receipts, or equal to one-third of the whole £506,988. This was £168,996. Then three-and-a-half months' automatic receipts would come in quickly; and the year's total being £414,334, this would equal £120,847. There was also credit allowed from sundry tradesmen £34,411. Adding these three items together, there was a sum of £324,254 in cash, against the five months' outgoings, which gave the money the tenant would require as £187,215. The present value of the ordinary meters and main cocks—not their cost, because the tenant would merely pay what they were worth when he took them over—was put at £148,617; while that of the slot-meters, cocks, and padlocks, was reckoned at £256,207. The cost of fixing ordinary meters, at 2s. 10½d. each, was £14,760; and of the slot-meters at 1s. 6d. each, £13,655. This made a total in connection with meters of £433,239. To this had to be added the present value of 226,249 shelves on which meters were placed, which was put at £4242. For stoves and fires on hire, including main-cocks and unions, a present value of £362,758 was included; while the cost of fixing 68,638 stoves, at 6s. 3d. each, came to £21,449. This made the total capital in stoves, after allowing for depreciation, £384,207. There were also 157,174 galvanized iron stove-stands, which were reckoned in at

£5902. The fitting and piping for 182,073 prepayment gas-meter installations, at 38s. each, came to £345,938. But this would not be the value to an incoming tenant; so he halved it, and put down £172,969. Other items were: Sundry stores, including purifying materials, £58,793; six weeks' coal, £75,044; unsold residuals, £65,374; tools and implements, £105,492; and bankers' balance, £25,000. Adding all these figures up, he arrived at £1,517,477, which he said any tenant of the undertaking would have to find in money first, or in tools, meters, and other things. The question was, What would the tenant expect out of the concern for finding this money? Taking all things into consideration, he contended that, for a tenant who was conducting a business from year to year, 10 per cent. was fair for profit, 5 per cent. as interest on the money he had to find, and 2½ per cent. for the risk a tenant might run. Under these circumstances, he claimed upon the tenant's capital 17½ per cent. This amount was invariably allowed in this Court; and he knew of no instance where any other percentage had been fixed. Under the Parochial Assessment Act, the Court had to find "what might reasonably be expected;" and it would not be reasonable to expect a tenant to take over the works for less than 17½ per cent. In the case of the *Queen v. Lee*, it was found that "17½ per cent. was a fair percentage to allow on tenant's capital, for interest on money, for his own trouble and skill, and for provision against risks and casualties." In the *Midland Railway Company v. Assessment Committee of St. Mary's, Islington*, it had also been held that the proper amount of interest on tenant's capital was 17½ per cent. He agreed that this was under the then existing circumstances. But this Court, down to the most recent times, had not altered the percentage; and he understood this was because, in their view, the circumstances were the same now of a tenant taking a gas-works as they were in the cases he had referred to.

The CHAIRMAN: You do not contend that it is not open to this Court, if, having regard to all the circumstances, they should come to the conclusion that it is too large an allowance, to alter it? It is a question of fact as to what was recognized by the Court under the circumstances.

Mr. BALFOUR BROWNE: It is perfectly competent to this Court, if they come to the conclusion that a tenant might be expected to do it at 15 per cent., to put it at that; but, at the same time, it is open to you to put it at 25 per cent. Continuing, he said he had taken the 17½ per cent. on £1,450,000 (which was £67,000 less than the tenant's capital at which he had arrived); and this gave £253,750. Coming to the "statutable deductions," the first was repairs and maintenance of works, plant, mains, and service-pipes. To arrive at this he divided the total amount of maintenance for the five years to June 30, 1905, by the total gas sold in the same period; and this gave 5·688d. per 1000 cubic feet of gas sold. Applying this average to the quantity sold in the year to June, 1905, he got £285,611, from which he took off £71,403 for repairs included in the working expenses, leaving £214,208. As to insurance, the total expenditure upon the works had been £4,825,168; and if £1,000,000 of this property was insured at 2s. 6d. per cent., the cost would be £1250. Therefore the total amount of statutables which were necessary to be expended for insurance and to retain the hereditaments in a condition to command the rent was £215,458. To summarize the figures, the gross receipts were £1,350,882, the working expenses £720,622, and the net receipts £630,260. The 17½ per cent. on tenant's capital—the occupier's share—came to £253,750, so that the gross value was £376,510. This was the rent which might reasonably be expected from a hypothetical tenant to a hypothetical landlord. The Act said that it was this rent, deducting therefrom the statutables, that gave the rateable value. The statutables in this case were £215,458; and deducting this from the gross estimated rental of £376,510, left a rateable value of £161,052 for the whole undertaking, which was made up of manufacturing stations, unproductive mains, and productive service-pipes and mains. The rateable value of the manufacturing part was agreed at £100,708, and that of the unproductive or trunk mains at £7907—together £108,678. Deducting this from the £161,052, which he gave as the rateable value of the whole undertaking, left £52,374 for the productive mains. In conclusion, the learned Counsel again quoted the case of the *Queen v. Lee*, to show that meters were held to be part of the tenant's capital; and he argued that in this respect stoves could not be distinguished from meters.

Sir RALPH LITTLER said that before evidence was called, he would like to point out that his learned friend was supplying to the Court figures based on one half of 1904 and one half of 1905. The second period, of course, was not in the quinquennial. The respondents had treated the whole thing as being in 1904, and had taken the figures of the complete quinquennial.

Mr. BALFOUR BROWNE said the Company had taken the last available complete year—down to June, 1905.

The CHAIRMAN remarked that he was afraid both sides were entitled to give evidence on their own figures.

Mr. *Arthur L. Ryde*, examined by Mr. W. C. RYDE, put in a valuation based on the accounts for the year ending June, 1905. This contained the figures quoted by Mr. Balfour Browne in his opening statement, and showed the rateable value of the productive mains to be £52,374, which, witness said, was equal to 3·867 per cent. of the gross receipts of £1,354,312. He had depreciated the slot meters by only 20 per cent., as against 25 per cent. for the ordinary meters, because on the average they were much newer. For stoves and fires he had allowed 30 per cent. depreciation, because in the first place they were older, and in the second place they got into a very bad condition. With regard to the 50 per cent. depreciation on the fittings and piping, they would be worth more than that to the Company; but an incoming tenant was what they had now to consider. A six weeks' stock of coal and oil would be necessary for the tenant; and as to residuals, they generally had to wait a month, on an average, before they got the money for them. The £67,000 which had been deducted from tenant's capital was to allow for possible errors. For the past twenty years, he always claimed 17½ per cent. on tenant's capital; and he thought he might say that over 90 per cent. of the decisions which were known were based on this figure. Applying his rateable value of £52,374 for the productive mains of the whole undertaking, would leave for Woolwich £1218; and adding this to the agreed figure of £259 for the unproductive mains, he arrived at a total of £1477, as against the £2150 (including the agreed £259 for unproductive mains) which was claimed. His evidence therefore brought out a considerable margin below the claim of the Company in this case. In their notice of appeal, the Company claimed a rateable value of 6 per cent., or £1891, for the productive mains, whereas his calculations showed a rateable value of 3·867 per cent., of the gross receipts.

The CHAIRMAN: You are actually allowing much more than you are proving.

Mr. BALFOUR BROWNE: Yes. We cannot get below the 6 per cent., we know, in this appeal; but we say we ought to get it upon the figures we give.

Mr. DANCKWERTS: We have a margin of over 2 per cent.

Mr. RYDE (to witness): Sir Ralph Littler said that he proposed to put in a valuation based, not on the year ending June, 1905, but on an average of years. The price of gas has not remained at a constant figure during the past five years, and it would be impossible to take any fair average over a period of years in which, quite apart from the different quantity of gas sold, the price of the gas varied from year to year?

Witness: Until we see how he is going to get over that difficulty, I do not know whether it is reasonable or unreasonable; but it would never be a rent from year to year, as the Act says.

Cross-examined by Mr. MARSHALL, witness said that if they wanted to arrive at the rent from year to year, they must take the latest information. If they were valuing for a number of years, they must take an average. The hypothetical tenant was to be a tenant from year to year.

Mr. MARSHALL: Therefore, when looking forward for a certain short number of years, would not the thing most likely to inform his mind be the history of the Company during an equal number of years immediately past?

Witness: Yes; that would be so if you had to get at the average rental value for the next five years. That is not my understanding of the definition in the Act.

Take the case of an ordinary business. A man wishes to become tenant of a business already established; would he be likely to confine his attention to the receipts and expenditure of one year, or would he not go, if possible, a little farther afield and see the history over a larger area?—He would inquire into more than one year.

Therefore, unless there is a restriction by statute, you think it would be a reasonable thing to do?—Yes, unless directed to do something else.

Is there anything which confines you to one single year, whatever the year may be, for the materials for assuming what a hypothetical tenant would give in the way of rent?—No, not in the statute, perhaps; but there have been cases which show you are bound to look at the latest information in the case of a Company which is growing.

But not shutting out earlier information?—No, of course not.

In further cross-examination, witness said that with regard to repairs he had taken an average over five years, because the Act specifically directed him to do so. Moreover, maintenance and repairs fluctuated more than anything else. In connection with these, the Act said, "deducting therefrom the average annual expense;" while in the other case the expression used was "tenant from year to year." Ten years ago, the gross receipts of the Company were £878,212, against £1,354,000; and then his valuation of the productive mains was £82,865, as compared with £52,374 in the present instance. This, however, was due to a variety of causes, one of which was that the parishes insisted on maintaining 5 per cent. on structural value for the works. While the percentage of total rateable value was known to vary, if one kept two-thirds as a stationary figure it stood to reason that the percentage of what remained must vary more still. On the last occasion when he gave a rateable value of £82,865, the Court fixed it at £140,272, which was 15¾ per cent. of the gross receipts. The main cause of the very large reduction now proposed by the Company was the growth of the prepayment meter business. The net receipts of the Company were earned now to a much larger extent by non-rateable property.

Mr. MARSHALL: If in the case of this particular Company you go on providing the penny-in-the-slot machines as rapidly as you have done lately, to the extent of £18,000 every half year, what is to prevent the rent of the landlord being extinguished altogether, according to your view?

Witness: You may take it from me that there comes what has been called a saturation point with these meters. The neighbourhood is nearly full up with them; and the Company are not providing them at the same rate as in the past.

The CHAIRMAN: Supposing that for any purpose the Company sold their gas so that there was no profit from the automatic meters, but a loss, and the greater part of the capital of the Company was in the meters, and it practically wiped out the rent, would you say that that is the law?

Mr. BALFOUR BROWNE: I should, my Lord.

The CHAIRMAN: I want the witness to say.

Witness: I do not quite agree with that.

Mr. BALFOUR BROWNE: As a matter of law, there is no necessity to protect the landlord's rent. If nobody will take the hereditaments, the landlord's rent is nothing.

The CHAIRMAN: I understood that to be the contention.

Sir RALPH LITTLER: If a man cannot get 17½ per cent., my friend says he will not take the premises. That is a strong proposition.

Further questioned, witness said everyone agreed that the amount of tenant's capital required to earn receipts per 1000 cubic feet of gas was immensely increased now beyond what it was ten years ago.

Mr. AVORY (in cross examination): Do I understand that your proposition before the Court is this: The South Metropolitan Gas Company, who in 1896, according to the judgment of this Court, would have been willing to pay a rent of £140,000 as the rateable value for the directly productive mains or services, would, with the gross receipts increased by 50 per cent., now only be willing to pay, according to you, about £50,000 for the same property?

Witness: Yes; but there are many other factors. Meanwhile, the assessment of the works has gone on steadily increasing, making a much larger proportion of the total.

Whereas you are now asking for 3·867 per cent., have you settled some of the other appeals on a basis of 7½ per cent.?—Sir George Livesey did; I did not. We strongly advised him not to settle.

Mr. BALFOUR BROWNE: We are not asking 3·867 per cent., but 6 per cent. in this case. We are giving evidence that we have offered them too much; but we know that we cannot depart from the 6 per cent. which is stated in our appeal.

Mr. AVORY: Are you aware the price of gas always gets down to its lowest in the year before the quinquennial valuation?

Witness: The price of gas must fall with the expenses; and you may depend upon its being kept down to the lowest possible point, owing to the competition with electric light.

Friday, March 1.

Mr. *Ryde* was to-day further cross-examined at some length by Mr. AVORY on the figures now produced as compared with those put forward on the occasion of the previous appeal in 1896. Passing on, witness said he was aware that in the recent Ipswich case the Recorder found himself bound to hold that there was no distinction between stoves and meters and fittings; and it was on the ground that he could find no distinction between them that he stated a case. The Recorder in that instance also included at witness's instigation gas-fittings, in the shape of brackets and other fittings, which were supplied by the Gas Company to houses. As a matter of principle, there was no distinction between gas brackets or fittings of that description supplied by the Company and stoves and meters. They would have to be provided by the tenant of the gas-works in the same way that the Company had had to provide them. The consumption of gas would not have been stimulated in the way it had been, without the provision by the Gas Company of these articles.

Taken in hand by Sir EDWARD BOYLE, witness admitted that his figures in the 1896 appeal worked out to 9 289 per cent. of the gross receipts, while the Court fixed the amount at 15·75 per cent. When the total gross receipts of the whole undertaking were about £800,000, the rateable value fixed by the Court was £140,272; whereas now the gross receipts were £135,400, he said that the rateable value should be £58,000. This was because the deductions had grown at a greater rate than the receipts. Applying this to the parish of Lewisham, in 1895 the receipts there were £59,000, and the Court fixed the rateable value at £9310. In 1905, the receipts were £104,000 odd; and witness said £4000 was a sufficient rateable value.

Sir EDWARD BOYLE: Supposing you put the price down to 1s. 6d. per 1000 cubic feet, you will get very little rateable value then; but you would not lose anything, because you could put it up directly after the decision to 2s. 6d.?

Witness: You must not ignore the working expenses; the price follows the working expenses.

Re-examined by Mr. BALFOUR BROWNE, witness said, with regard to workmen's deposits, that he had not included these, because he did not think the tenant would get them. He did not think the workmen would deposit with a tenant such an amount as £50,000, or any sum. The principles on which his valuation of 1896 was based were the same as those which governed his present figures.

The CHAIRMAN: I understand, Mr. Avory, you are not contending that, supposing the circumstances are the same to-day, if the Company could show that the 1896 valuation should be a different one, they are precluded from doing it? Supposing that they had either omitted something or there had been a wrong conclusion in 1896, and the Court fixed a wrong percentage, there is nothing to prevent the Court to-day from fixing their own valuation?

Mr. AVORY: Not if the Court is satisfied there was any mistake made in 1896.

Re-examination continued: The suggestion that the accounts had ever been manipulated for the purpose of assessment was ridiculous. Thirteen parishes that were not appealing, out of twenty-four, had assented to a reduction.

Mr. *W. A. M'Intosh Valon*, examined by Mr. RYDE, also put in a valuation of the undertaking made by his firm, based on the accounts for the year ending June 30, 1905. This showed the rateable value of the productive mains to be £55,580, which was equal to 4·1 per cent. of the gas, meter, and stove rentals (£1,354,312). The total working expenses he allowed as proper in a rating calculation were £1,144,924; and deducting this from the £1,857,870 gross receipts (after deducting bad debts), left the net receipts at £712,946. He allowed 4½ months of the total working expenses as necessary for the tenant to have from the beginning of the year until such time as his receipts were sufficient to meet his outgoings; for a company of this kind would not expect to get in much money until the end of 4½ months. This came to £429,346. He credited the hypothetical tenant with the value of the whole of the residuals which were sold for cash in 4½ months; and so far as they were not sold for cash, he assumed that the receipts would be six weeks behind, and put down 3 months' credit. The total amount he allowed off the working expenses for residuals was £138,510. Then he included 3½ months' automatic receipts—£120,847—as it took a month or six weeks to go the round of the meters; and he also allowed the consumers' deposits—£21,598—for which he included 5 per cent. in the working expenses. The total of these deductions was £280,955, which, taken from the £429,346 already mentioned, left £148,391. To this he added the following items: Three months' rates (say), £16,000; six weeks' stock of coal, £75,044; stock of residuals, £65,374; tenants' portion of sundry stores and tools, including stock of meters and stoves and office furniture, £156,395; meters in use and fixing (allowing 25 per cent. depreciation on the ordinary, and 20 per cent. on the prepayment), £426,818; meter shelves, £4242; stoves and fires in use and fixing (less 33⅓ per cent. depreciation), £359,783; stove stands, £5902; prepayment fittings and pipes, £172,969; and cash at bank, £25,000. The Company were compelled by their agreement with the bank to keep a perpetual balance of £15,000 for meeting the difficulty of getting rid of the supply of coppers; and he thought in addition £10,000 was only a reasonable sum as a margin to work with. The total tenants' capital, adding all the figures just given, came to £1,455,918; but he had allowed 17½ per cent. on the round figure of £1,440,000. This gave a return to the tenant of £252,000. Previous to 1895, he had at times thought that some less amount than 17½ per cent. should be allowed off some of the items in the tenant's capital; but in 1896 he thought Mr. M'Connell made it quite plain that this Court would not look at anything less than 17½ per cent.; and since then, whenever valuing for one side or the other, witness had always allowed 17½ per cent.

The CHAIRMAN: Have you altered your own opinion?

Witness: I think I have, for the simple reason that the business is not what it was—money is much dearer, there is fiercer competition; and the way in which the Company have to conduct their business is very much more expensive. Therefore I think that now 17½ per cent. does apply to the whole.

Examination resumed: His statutable deductions he had taken at the same figures as the previous witness, Mr. Ryde. Repairs and renewals fluctuated a good deal; and unless a balance was struck by taking an average of five years, as the Act directed, one could not possibly arrive at a proper conclusion. He had deducted as tenant's portion (being included in working expenses) £55,433, from the total of £285,611 for repairs and maintenance, making the amount £230,178. The reason he fixed upon this figure of £55,433, was because experience had shown it to be correct. It was a figure he had relied upon for a great many years. It was about one-sixth of the total, *plus* 7½ per cent. to cover the repairs to the Company's large number of barges. His total deduction for statutables, including repairs and insurance, was £231,428; and deducting this from the gross value, the rateable value *plus* rates was £229,518. Deducting the £65,332 for rates from the figure for rateable value *plus* rates, left the rateable value of the whole undertaking at £164,186. This figure was within a very few pounds of 4½ per cent. on the actual capital outlay. It was an absolute net sum, after providing for repairs, maintenance, and everything; the property being kept up in a sufficient state to earn the rent.

Cross-examined by Sir RALPH LITTLER, witness repeated that Mr. M'Connell had distinctly told him that he would not allow anything but 17½ per cent. in that Court; and on the present occasion he had allowed this sum all round. It was also his own belief to-day that 17½ per cent. was the proper figure to allow. Since 1896, when Mr. M'Connell made the statement to which he had referred, witness had never put in any valuation he had made, either for an Assessment Committee or for a Company, at any other figure than 17½ per cent. In 1896, he gave on meters and stoves 12½ per cent.; and he had given his reasons for the alteration he had now made. Witness was then questioned at length on his figures in 1896—when he appeared on the other side—as compared with those he now gave. He said it had been decided, he believed, that mains belonged to the landlord and meters to the tenant; and on this principle he valued. One reason was that the meter was removable, at the pleasure of the tenant or the occupier, and the main was not.

In re-examination by Mr. BALFOUR BROWNE, he said it was a natural thing for an incoming tenant to take over the residuals of the outgoing; he must do so. Otherwise he would not have any residuals possibly for three months to sell, and he would not have any to carry on his business with, which he must have. If the 17½ per cent. was the right figure, the tenant wanted it on all his capital. It did not matter whether the capital was in the bank, where there was no risk, or in tools or coal.

Saturday, March 2.

The CHAIRMAN, at the opening of the proceedings, said Mr. Balfour Browne had told them on the previous day that the figures which the appellants had put forward with reference to the productive mains would represent 6 per cent. The figure arrived at by Mr. Ryde in his valuation was 3·867 per cent. of the gross receipts, representing a rateable value of the mains of £52,374. The 6 per cent. on his basis would represent £87,000, or something like that—a difference of some £35,000 or £36,000. As he understood it, this was calculated on 17½ per cent. as the occupier's return on capital; and taking this figure for one moment, it represented with regard to working capital a sum of about £150,000 or £160,000 to be cut off before the appellants would be in the wrong.

Sir RALPH LITTLER remarked that the Court decided upon 15 7 per cent. of the gross receipts as the rateable value in the last appeal; and now Mr. Ryde reduced this to 3·867 per cent. The 15·7 per cent. was the judgment of the Court, not a valuer's figure.

Mr. *E. H. Stevenson*, examined by Mr. RYDE, said he had made a valuation for rateable value of the whole undertaking and the allocation to the parishes concerned in the appeals. He put the gross receipts at £1,350,882; and the working expenses, *minus* rates, at £642,256. This made the net receipts, *plus* rates, £708,626. To arrive at the tenant's capital, he put five months' working expenses (*minus* rates), residual products, and rates and taxes, which came to £505,935, and deducted from this four months' receipts for residual products, 3½ months' prepayment meter receipts, and an amount due to sundry tradesmen for tenant's stores. These deductions came to £328,584, and left £177,351, to which he added the following: Meters at present value fixed, £410,122; meter shelves, £4242; stoves and fires on hire fixed at present value, £359,777; stove stands, £5932; fittings and pipes in houses, £172,969; sundry stores, £50,923; stock of coals, six weeks' average, £75,044; stock of material for purifiers, £7890; unsold residuals, £65,374; tools, implements, and furniture, £105,492; cash at bankers, £25,000. This made a total of £1,460,066; but taking the tenant's capital at (say) £1,400,000, the occupier's share thereon—at 17½ per cent.—would be £245,000. The statutable deductions—for repairs, &c., £285,611, less £57,122 attributable to tenant, and for insurance £1250—he put at £229,739. Deducting the tenant's share of £245,000 from the net receipts, there was left a gross value, *plus* rates, of £463,626. As shown, the statutable reductions were put at £229,739, which made the rateable value, *plus* rates, £233,887. Taking from this the rates (at 7s. 11½d. in the pound) £66,576, there remained £167,311 as the rateable value of the undertaking, which, less the agreed sum of £108,678 for the works and trunk mains, left the rateable value of the productive mains at £58,633, or 4·33 per cent. on the £1,354,312 gross

receipts. His figure for the value of the meters he arrived at by taking 33⅓ per cent. depreciation off the ordinary meters and 5 per cent. off the prepayment ones. Thus his total was about £23,000 less than Mr. Ryde's. All his figures were based on the undertaking as a going concern. He had allowed 17½ per cent. on tenant's capital, because he was accustomed to do so now. He had allowed it to the local authorities in the Water Board cases, and he had taken it for companies as well. This figure was generally allowed in practice, though there were a few cases in which it was not. As to the statutable deductions, he had followed the same method as the other witnesses in taking the average of five years' repairs and maintenance, and reckoning it out on the consumption of the account year. This was the only proper way, as one year the Company would spend a much larger amount than another.

The CHAIRMAN: You do not dispute this method of doing it?

Sir RALPH LITTLER: We agreed five years is the proper method, assuming the right amount to be found.

In further examination, witness handed in a table showing the interest received on capital employed by the landlord, based on Mr. Ryde's valuation. The capital employed by the Company on June 30, 1905, was £5,096,545, from which had to be deducted the amounts allowed as depreciation upon chattels in the tenant's capital—meters and shelves, stoves and fires and stands, and fittings and pipes—£445,408, leaving as depreciated capital £4,651,146. Deducting from this the tenant's capital as claimed by Mr. Ryde (£1,517,477) there remained £3,133,669 as the balance of capital employed by the landlord. The rateable value or rent, as found by Mr. Ryde, was £161,052; and this was 5·14 per cent. upon £3,133,669. This was a percentage which any landlord of a works or factory would be glad to get as rent on a full repairing lease. The tenancy in this case was better than that—being a perpetual full repairing lease, *plus* the renewing of the structures and plant when worn out. It was therefore a good rent for the landlord to receive on his invested capital. If he applied to the landlord's capital his own rateable value, being slightly above Mr. Ryde's, it would give a little more than 5·14 per cent. He thought there was not anyone who would not build a factory if he was certain of letting it year in and year out for ever at over 5 per cent. The 5·14 per cent. was an absolutely net figure, because all depreciation, repairs, renewals, and insurance were provided for.

Cross-examined by Sir RALPH LITTLER: His chief reason for allowing the 17½ per cent. was that this figure was usually taken. It was not what the tenant received, because he had to replace a considerable amount of depreciated capital during his tenancy. Probably the 17½ per cent. in this particular case represented a return of about 14½ per cent. to the tenant. The Company had to spend, or rather the tenant would have to spend—and could not get out of it, as a statutory concern—about £120,000 a year on new prepayment meters, fittings, stoves, ordinary meters, and such things. At the end of the tenancy he lost one-third; and this had to be replaced out of any profit he earned. He agreed with Mr. Valon that tenants must have this 17½ per cent. as an irreducible minimum, whatever effect it had on the landlords. If the landlord had a property which would not bring him in a rent, he was to be pitied; but the rent had to be fixed under a particular Act. It was not a question of bargain between two people.

Sir RALPH LITTLER: Supposing the result of the penny-in-the-slot meter increase were to bring the landlord's rent to nothing, would the tenant still get 17½ per cent.?

Witness: In my opinion, unless the Courts in the meantime settle a lower percentage than has been already settled, the landlord would not get anything.

Cross-examination resumed: The connection in the case of a slot-meter was exactly the same as in that of an ordinary meter. In all cases service-pipes (unless laid through a long distance of private land) were provided by the Company up to the meter; and sometimes if a customer was going to have a stove, the Company themselves would put in a pipe to it.

Cross-examined by Mr. CRIPPS: The Gaslight and Coke Company and the Commercial Company paid more in rates and taxes per 1000 cubic feet of gas sold; but this was to be expected as the charge upon their capital account per 1000 cubic feet sold was higher than that of the South Metropolitan Company.

Mr. AVORY cross-examined witness to show that one difference between ordinary and prepayment meters was that with the former the pipes in the house were always charged with gas, whereas with the latter there was no gas passing through unless the consumer chose to put in a penny; but witness replied that many people turned off the main-cock of ordinary meters at night, while with prepayment meters there was nearly always gas in the pipes, because another penny was put in before the previous pennyworth of gas was quite consumed. In answer to further questions, he said he should not include mantles sold by the Company as part of the tenant's capital. They belonged to a subsidiary trade. Glass globes, however, were included, as it was part of the Gas Company's business to supply fittings, and these carried the globes with them. Counsel repeatedly asked witness why, if he included globes in his item of fittings in tenant's capital, mantles should not also be included; and at last

Mr. DANCKWERTS said: My learned friend may take it they should be included according to our view; but we have not done it.

Re-examined by Mr. DANCKWERTS, witness said his view was that any tenant who carried on the business of the Company was bound to invest in slot meters and stoves. Somebody must find them—the consumer could not, the landlord would not, and the tenant therefore must. He saw absolutely no difference between the use of slot meters and ordinary meters. He saw no difference in principle between turning on the gas by means of a penny and by means of a handle. He was aware of the decision of the Court of Appeal that "fittings" meant stoves and fittings; and he could see no difference, in point of principle, between a stove and any other fitting for the consumption of gas. Fittings were let on hire in connection with the slot meters.

The CHAIRMAN: Is it not after all a subsidiary undertaking? Could not the tenants purchase globes, pendants, mantles, and everything of that kind for their own use in the way other people do?

Witness: They will not do it.

Mr. AVORY: I want your Lordship to ask witness this question: Is there anything to prevent the ordinary tenant or consumer from providing his own gas-stoves if he likes?

Witness: Nothing. A great many do; but none of the prepayment consumers. A great many people in really good houses hire their gas-stoves for heating and cooking.

Mr. *Frank Bush*, the Secretary of the Company, examined by Mr. DANCKWERTS, said that for the year 1905 the cost of each prepayment installation was 38s. 2d.; and for the previous year it was slightly more. The Company did some of the work themselves; but in addition they employed a number of contractors. Seven or eight of them charged 28s. for finding all the barrel-pipe that went in the houses and for the labour. He believed 16s. was for the pipe, and 12s. for the labour. Contractors had put up 9119 sets, for which the Company paid them £14,361. This came out at an average cost for piping and labour of 31s. 5d. So that there must have been some extra points put in. If to this was added 6s. 9d., the cost of the fittings, the 38s. 2d. he had mentioned was arrived at. For the year 1904, the cost was 38s. 8d. Though they were now only paying the contractors 28s., there had been years when they paid 30s., 32s., 34s. 6d., and even 35s. The Company's books showed that the slot-meter collection week by week for the account year came to £414,333. Witness produced a table showing that the outstanding accounts and wages for the half year ended June 30, 1905, amounted to £49,324, which sum Mr. Ryde had divided up. Continuing, he said that, in order that they might get rid of their large number of coppers, the Company had to arrange with their bankers to keep a fixed balance of £15,000; and in addition, they paid them £1000 a year.

Mr. AVORY announced that the respondents would reserve their cross-examination of this witness.

The hearing was then adjourned *sine die*.

Sequel to a Gas Explosion.

At the Wandsworth County Court, on Monday last week, Mrs. Sarah Dean, of Farthing Lane, Wandsworth, brought an action to recover damages from the Wandsworth and Putney Gas Company for injuries she received from an explosion caused by an escape of gas. She said that on the 28th of December last, while she was passing the corner of Atheldene Road, Wandsworth, an explosion occurred, and she was thrown to the ground. She was very much injured, and had been receiving medical attention ever since. It was found that the explosion was due to an escape of gas from a main belonging to the Company. Mr. Williamson, who keeps a shop near the spot where the explosion occurred, said a fortnight before the accident he smelt escaping gas, and telephoned to the defendants, asking them to attend to the matter. The gas was entering his shop through a hole through which a telephone wire passed, and the Company's men plugged this hole up with putty. Mr. T. Harrison, an engineer, said it was possible that, as a result of the hole being plugged up, the gas collected in the telephone box outside. It then commenced to escape through the edges of the cover, and someone threw down a lighted match, and the explosion followed. Mr. W. R. Pether, a Consulting Engineer, expressed the opinion that it was an extremely negligent act on the part of the defendants' servants to plug up the hole. Mr. Borewood, an Inspector in the service of the Company, said the men did a perfectly proper thing when they plugged up the hole, though he admitted that the plugging would cause the gas to accumulate in the ground. The plaintiff was awarded £25 damages, with costs.

Gas Profits at Lincoln.

In bringing before the Lincoln City Council a recommendation of the Gas Committee that the sum of £4000 should be appropriated out of their profits in aid of next year's general district rate, the Chairman (Alderman Wallis) gave some particulars of the operations of the undertaking in the twelve months now closing. He said the total receipts were given as £45,774, as against £45,643 last year; and the expenses as £33,733, against £34,621. This left a gross profit of £12,041, as compared with £1021. Out of this they had to pay interest on stock, sinking fund, and other charges, amounting to £7962, leaving an estimated surplus of £4079. The figures given, he explained, were only rough ones; and the full particulars would be obtainable when the accounts of the Committee were made up. They were, however, satisfied that they would have the £4000 to pay over. Mr. Mills congratulated Alderman Wallis on the year's trading, and asked if the Committee would take into consideration the question of supplying gas-cookers free. Alderman Wyatt added his congratulations, and said the state of the Gas Committee's affairs must be satisfactory both to the Corporation and to the consumers and ratepayers. They were much obliged to the Chairman (Alderman Wallis) and the Manager (Mr. John Carter). Mr. Pennell, in tendering his acceptance of the £4000 on behalf of the Finance Committee, said it would be very useful; and he hoped it would be the means of their not being compelled to raise the rate for the coming year. Alderman Wallis remarked that the question of free cookers had already been considered by the Committee; but they were not at present prepared to recommend them. They, however, hoped in the near future they would have something to propose in this direction. The Mayor (Col. J. S. Ruston) congratulated the Committee on the splendid results shown, and the recommendation was adopted.

Gas-Works for South Brent (Devon).—It appears that the proposed gas-works at South Brent will soon be an accomplished fact. The whole of the capital is available, a site for the works has been purchased, and as soon as plans and other preliminaries are complete the work will be put in hand. It is hoped that by next winter the little health-resort will be illuminated by gas instead of oil-lamps, with which the inhabitants have been quite contented for the past thirty years. The undertaking is a private one.

MISCELLANEOUS NEWS.

WORKING OF THE NOTTINGHAM GAS UNDERTAKING.

Opening of the Public Inquiry.

At a Special Meeting last January, the Nottingham City Council, after a long discussion (*ante*, p. 167), decided that a Committee of five members should be appointed to hold a public inquiry into the working of the gas undertaking during the past five years. At the following monthly meeting, the Committee was chosen; the members of it being: The Mayor (Alderman J. A. H. Green), Mr. S. Cook, Dr. Dabell, Mr. E. N. Elborne, and Mr. E. L. Manning. The first sitting was held last Thursday, when Mr. Frank B. Harris, the Assistant Solicitor to the Corporation, and Mr. J. H. Brown, the Gas Engineer, were the two witnesses called.

The MAYOR (at the outset of the proceedings), explained that with a view to a public inquiry, advertisements had been issued in the local Press and elsewhere, inviting those who desired to give evidence to send in their names, with a short statement of the points with which they wished to deal. Practically no statements had been volunteered, though one or two letters referring to points that were thought to be worthy of the attention of the Committee had been sent, and one or two gentlemen had expressed a desire to come before the Committee on one or two minor points relating to details connected with the working of this, or any other, gas undertaking. The Committee had resolved to consider the question referred to them—the working of the undertaking during the past five years—under the following heads: (1) Plant and distribution. (2) Quality of the gas. (3) Method of obtaining contracts for plant, goods, and materials. (4) Price charged for gas. They had determined also that, as far as was possible, the evidence taken at one time should be under one particular head of inquiry, and that one person should be examined upon only one subject; but the same person might be called upon to give evidence at more than one sitting. He might speak on one day as to plant, and on another as to price. They could not do better than commence with a sort of historical survey of the procedure of the Gas Committee during the last five years. Sir Samuel Johnson, the Town Clerk, was not in the best of health; but Mr. Harris, the Assistant Solicitor to the Corporation, was as conversant with the matter as was Sir Samuel. He had received no intimation from the three members of the Council who gave evidence at the last inquiry as to whether they were coming forward again.

Mr. *Frank B. Harris*, Assistant Solicitor to the Corporation, and Assistant Clerk to the Gas Committee, said that at the beginning of 1902, the Chairman was Alderman Ford, and the Vice-Chairman was Mr. Truman. On Nov. 11, 1904, Mr. Harlow was appointed Chairman, and continued in that position until June, 1906, when Mr. Ashworth acted as Chairman. Mr. W. R. Chester was the Gas Engineer at the beginning of 1902; and in January of that year he fell ill. Prior to his illness, he had not been officially commissioned to undertake private work. In January, 1902, he was so ill that he applied for leave of absence for two months. This period of leave had to be extended; and before the extension had expired he died. Mr. Brown was appointed on Sept. 11, 1902. On Sept. 8, just prior to the appointment, Alderman Radford had made some strong criticisms at a meeting of the City Council as to the condition of the undertaking and its management. On Oct. 6, the Committee brought up a report referring to these criticisms, and considerable discussion took place. As a result, Sir George Livesey was called in; and inquiry into the whole thing was begun. Mr. Brown did not come to Nottingham until a short time after. Sir George's report advocated a reduction in the candle power of the gas. On Feb. 23, 1903, other resolutions were passed on the subject, with the result that the Engineer was requested to report as to the difficulty of reducing the candle power of the gas and giving information to the consumers as to the type of gas burners and fittings most suitable for the incandescent system. In the reports of both Mr. Brown and Sir George Livesey it was emphasized that the fittings of the consumers should be looked after if the illuminating power were reduced. On July 9 there was a complaint of the prevalence of naphthalene; and instructions were given to the Engineer to make certain alterations, which were not to cost more than £1000. About that time, Mr. J. E. Moon was appointed Superintendent of the works at Eastcroft. The question of the maintenance of the fittings, &c., was from time to time before the Committee; and it was also decided to spend £1500 on certain machinery at Eastcroft. On Jan. 7, the Engineer made a long report on the distribution and the mains; and a report was also made with reference to the efficiency of the storage accommodation at Radford and Basford. Mr. Brown was asked to get tenders for increasing the storage accommodation; but nothing was done. On July 20, 1904, there was a minute headed "Naphthalene in the Gas," in which the inspector reported there had been a great deal of difficulty caused by the presence of naphthalene in the gas; and in a period of about two months over 2000 gas-lamps had been extinguished from this cause. The minutes referred to individual complaints; and it was resolved that something be done immediately to check the complaints. The Engineer recommended that a naphthalene "scrubber" be erected at Basford, at a cost of £500, which was done. On Sept. 15 there was a report from the Engineer on old service-pipes, which he said in many instances had become worn out, and in other cases were inadequate for the purpose; and this gave rise to many complaints of insufficient pressure. He reported also on difficulties of distribution at Beeston and Ruddington; and steps were taken with a view to remedy them. Witness mentioned that £6000 was spent on water-gas plant. There was no special minute of the Committee authorizing the erection of the carburetting arrangement. He believed the expenditure was included in the £18,000 for general extensions at the Basford works on May 1, 1905.

The MAYOR read out the various principal items of expenditure on improvements which made up the £18,000, but said there was no mention of a carburetted water-gas plant. He pointed out that there was a minute authorizing the erection of a water-gas plant to cost £2300, with a further £760 for building extensions; but the blue water-gas plant and the carburetting arrangement cost £6000, of the authorizing of which expenditure there was no minute. He asked Mr. Brown to throw some light upon the matter.

Mr. *J. H. Brown*, the Gas Engineer, explained that the plant had not been definitely ordered by the Committee; but the matter came on with respect to a special tender for the purchase of oil—a contract of a million gallons of American oil. The cost of the water-gas plant was included in the £18,000. The carburetter plant was decided upon later in the year; and the matter did not come officially before the Gas Committee. There was a minute authorizing the purchase of oil for the carburetter. If they accepted the purchase of the oil, they must of necessity accept the authorization of the plant. So far as his memory served him, the carburetted water-gas plant was on only one occasion discussed by the Committee. The reason the subject was brought up suddenly was because with the approach of winter they were in difficulties with regard to storage; and he believed they would be in a much better position if they erected a carburetter in addition to the water-gas apparatus. Mr. Harlow, the Chairman, he thought, gave the definite order for the plant.

The MAYOR said, with regard to various contracts, the Committee would like to know of any case in which the lowest tenders had not been accepted. This meant that if the officials had a list of tenders, the Committee would like to have them tabulated—he meant a list of the last five years' contracts for materials and for works.

Further examined, witness stated that when he took charge of the gas-works twenty retorts of the sixty at Basford were dangerous, and not fulfilling their purpose; some of the other forty were in a shocking condition; and the make of gas was ridiculously small in consequence of the bad state of repair and the old-fashioned plant in use. Some old beds of retorts were not being worked at all. With regard to the necessary repairs to the Basford works, he said that last year's repairs were neglected; and that the works, which had been brought up to a fair state of efficiency, were now in a worse condition. No reason had been given to him by the late Chairman for the necessary repairs not having been gone on with. He also spoke as to the antiquated nature of the Radford works. He said the Radford plant for treating the gas when it left the retort-house was not sufficient to deal satisfactorily with the gas made in No. 2 retort-house. The Eastcroft plant, on the other hand, was in very good condition indeed, having been recently reconstructed. He had reported to the Committee from time to time on the repairs and reconstruction work he considered necessary; but the Committee had not on all occasions carried out his views.

The MAYOR said he would be pleased if, at the next meeting, Mr. Brown would be ready to tell them what suggestions of his had not been carried out. He added: "If there is any defect in the concern, the responsibility is either yours for not advising the Committee, or the Committee's for not taking your advice."

In answer to further questions, witness said when he first came to Nottingham he was told by the Lighting Committee that it was impossible for them to adopt incandescent burners in the street-lamps, because of the great trouble they had with naphthalene. They said they had had to abandon them. His experimental water-gas plant was his first attempt at reducing the naphthalene; and the complaints had been reduced very considerably. He produced a table of statistics showing that the complaints in 1895 numbered 3700; in 1902, there were only 32; in 1903, there were 11, rising again in 1904 to 1074, in 1905 to 2262, and falling again in 1906 to 1416. In the meantime, the consumers had increased from 39,000 to 63,000; while the naphthalene complaints had fallen practically from 3700 to 1400. At first he had a good deal of difficulty with regard to distribution, which, however, had now been very largely overcome by altering the mains and the valves. The condition of the mains and the absence of maps and charts in some of the districts were serious difficulties; and he gave one instance which showed this very forcibly, in which a governor which had been supplying two districts could not supply one alone. The pressure practically disappeared; and the gas would have gone out, but for one of the officials noticing it. They found out afterwards that the gas for No. 1 district had not come from these works at all, but from another part altogether, by a way no one knew of. The advice he gave to the Committee as to distribution had been carried out; and he was now quite satisfied in this connection.

The Committee then adjourned till to-day (Tuesday).

BELFAST GAS PROFITS AND THE RATES.

At the Monthly Meeting of the Belfast City Council, Mr. J. A. Doran, in moving the adoption of the Gas Committee's minutes, made some reference to the grant promised in aid of the rates. It might not, he said, be generally known that from time to time they had given large sums out of their funds for the purpose of keeping down the rates, and that up to the end of the present financial year they had contributed a total of £180,690 towards this object. They had hoped these amounts would have made some reduction in the rates; but it seemed that the opposite was the case, as instead of being reduced they were increased. He did not know where all the money went to; there must be waste somewhere. The contribution they had promised for the coming year would amount to over £30,000, or an equivalent of 6d. in the pound on the rates; and in giving this large sum, the Committee were hampering themselves financially so that the rates might not be increased. He wished to warn the spending departments that it would be impossible for them to continue paying these large amounts away, for the very good reason that they would not have them to give. The prices of coal, oil, and other materials had increased considerably, and the price of gas had been reduced; so that they could not expect to have the large profits they had had in the past. He hoped, therefore, that a close watch would be kept on all the spending departments. He might add that the sum of £180,690 which he had referred to as having been contributed for various purposes included the dividends and sinking fund on stock issued for payment on the new City Hall, which they agreed to pay for ten years. Three years of this period were unexpired, so that up to the end of that time the ratepayers would not be called

upon to pay a single penny towards the cost of the building. These payments amounted at present to over £10,000 per annum.

In the course of the subsequent discussion, Alderman Byrne made the interesting suggestion that some of the gas profits might go towards the reduction of the price of electric light. On the other hand, Mr. Boyd very fairly argued that it was only justice that those who consumed the gas should receive benefit from the profits. Mr. Magee had always been opposed to these contributions by the Gas Committee to the rates; for he felt that the Committee should first satisfy the consumers that they were giving them value for their money. In January last, the Committee appropriated their profits in a certain way; but he thought they would have been wiser if they had placed a large amount to the reserve fund. The citizens were promised that when the revaluation came into operation, the rates of the city would be largely decreased; and they were reduced last year to the extent of some 5d. in the pound. But this year they were raised again by 3d. and 4d.; and they would be still higher were it not for the fact that they were receiving from the Gas Committee a sum equivalent to 5d. in the pound. He thought these grants were only an encouragement to the large spending Committees to continue their excessive expenditure; and instead of making such contributions, it was the duty of the Gas Committee to provide a substantial fund to deal with contingencies that might arise. In reply to this, Mr. Finnigan pointed out that the Gas Committee had actually a sum of £50,000 put by for depreciation. Mr. Magee asked where it was; and Mr. Doran answered that it would be very difficult to say where it was invested. He thought it was invested in the works, which was as good a security as they could get.

GAS EXTENSIONS AT WIGAN.

Objections to Water Gas.

At the Monthly Meeting of the Wigan County Borough Council last Wednesday, Alderman Holmes, in moving the confirmation of the minutes of the Gas Committee, said there were some matters of importance to consider. The Committee were proposing to apply to the Local Government Board for sanction to borrow £20,500 for the supply of meters, and for the extension of mains and services in connection with the undertaking. In 1904, sanction was obtained to borrow the sum of £25,332; and of this, £18,873 had been expended. They had overspent on mains and services £1648; and the amount unexpended for meters was £116. The Committee estimated that they would require over the next three years, including the amount overspent for mains and services, the sum of £10,000 for prepayment and ordinary meters, and £10,500 for new mains and services—making a total of £20,500. The Council would also perceive that the consumption of gas was hourly and daily increasing. Between April 1, 1906, to Feb. 15, 1907, the increase amounted to 12,241,000 cubic feet. This showed that it would be very necessary within a very short time to extend the works to meet the requirements that were being called for. One great cause of this was the fixing of slot-meters. They had now 6539 slot-meters and 12,655 ordinary meters fixed. This rendered it necessary that some further preparation should be made for the production of more gas, because during the winter season—and especially on days when thick fog hung about—the consumption of gas was much greater than at other times; and if this took place for two or three foggy days, there was no question that the supply of gas would run short, and the town and district would be plunged in darkness. Therefore, considering this matter, the Gas Engineer (Mr. J. Timmins) had advised the Committee to put down an installation of carburetted water-gas plant. This would enable them to produce 600,000 cubic feet of gas per day, and would cost only about one-half what an extension of the coal-gas plant would cost to produce the same quantity of gas. The working cost of the system would also be considerably less than that of coal gas.

The motion having been seconded, Mr. M'Quaid said he thought the Council should hesitate considerably before they placed in the hands of the Gas Committee power to initiate a system of carburetted water gas, which was most deadly. Seeing that Wigan had done without water gas for so long, it was rather late in the day to introduce it now. He should not give his consent to an installation of this description being put down, until he was perfectly assured that there was no possibility of any fatal accident happening through it. Mr. Belshaw said, after Mr. M'Quaid's explanation, he personally was prepared to give the matter further consideration. For the sake of £3000 or £4000, he would not subject the public to such a danger. Mr. Benson wished the Committee would take the matter back and consider it, and let the Council have something more on the subject than was then before them. In order to test the matter, he moved that this part of the minutes be referred back for further consideration. Mr. Fletcher seconded, and Alderman Ashton said he had no doubt the Chairman of the Gas Committee would take the matter back, if the members of the Council thought there was any danger with regard to the introduction of carburetted water gas. The Gas Engineer would hardly recommend them to adopt the system for emergencies without he was certain that he was recommending something that would not be dangerous to the lives of the people. At the same time they would not lose anything by the Committee taking it back, and discussing the matter from a health point of view. If they came forward again next month with the recommendation, they would adopt it.

In reply, Alderman Holmes said he thought the Council were taking too serious a view of the matter. In these times, when there were high rates, they must do something that would assist them in carrying on the work of the Corporation. The system they recommended was in use in something like 150 towns, and why should not Wigan adopt it? There would be a very great outcry if they were to run short of gas, and the town and district were left in darkness. Their only desire in recommending the system was to benefit the town. He did not want to take the minute back; but if it was the wish of the Council, he would do so.

The minutes of the Committee were then passed, with the exception of the part relating to the installation of the water-gas plant, which was referred back for re-consideration.

FALMOUTH CORPORATION AND THE GAS COMPANY.

Withdrawal of Opposition to the Company's Bill.

At the Meeting of the Falmouth Town Council last Thursday, the General Purposes Committee reported that they had conferred with the Directors of the Gas Company concerning their proposed Bill and the requirements of the Council, and the Directors had agreed to the loan capital not being converted into share capital; the rate of interest on the preference stock to be reduced from 6 to 5 per cent.; the standard price of gas to be lowered from 4s. 2d. to 4s., on condition that the model clause be inserted; and that no other residual product except sulphate of ammonia should be manufactured on the new land. The Directors stated that the clause as to the renewal fund was in the ordinary form, and therefore they could not agree to the fund being limited to one-twentieth instead of one-tenth of the paid-up capital. They could not agree to the repeal of their existing powers of manufacture over the 40 feet of the old land. As to water gas, there was no legal percentage prescribed in other cases, and therefore they could not agree to the limitation proposed by the Council. As the Company were liable for any damage caused by residual products flowing into the harbour, the Directors could not agree to the further penalties asked for. They denied that any payments on capital account had been charged to revenue account, as suggested. It was altogether impracticable to move the works, and they would not agree to any purchase clause being inserted. The Committee, having conferred with their Engineers and Parliamentary Agents, decided not to press the point as to a reduction in the renewal fund; that the reduction of 2d. in the standard price be accepted on the condition named; that the Council should not insist on the repeal of powers over the 40 feet of the old land; that no percentage of water gas be pressed for; that the restriction as to the manufacture of residual products be accepted; that the amendment as to penalties for bye-products flowing into the harbour be waived; and that the Council do not proceed further in their opposition to the Bill as regards the removal of the works. The Committee were divided in opinion as to the desirableness of insisting on the introduction of a purchase clause; but a majority was against further opposition to the Bill for the purpose of securing this concession.

The Council discussed the report at some length. Mr. Bullen urged that a purchase clause should be inserted, as the undertaking ought to be in the hands of the Corporation; but Mr. Williams said he voted against the purchase clause because their experts advised them that it could not be inserted unless they were prepared to move the works from their present situation. This would mean an expenditure of at least £20,000 in addition to that of purchasing, and would land the town in serious difficulties. Mr. Owen complained that too much of the business had been transacted in committee. They ought to have had a ratepayers' meeting to consider the advisability of purchasing the gas-works. Mr. Fox protested against the notion that a purchase clause was of any use unless they intended to buy the works. Mr. Cox contended that the negotiations could not have been carried on in public. No one could show that if the Council purchased the undertaking they could carry it on without aid from the rates. They were not justified in continuing the opposition for the sake of a few concessions which they might or might not obtain.

The report of the Committee was adopted.

PUBLIC LIGHTING AT DEVONPORT.

Victory of Gas.

A Special Meeting of the Devonport Town Council was held last Tuesday, to consider the question of lighting certain streets in the centre of the town. The Deputy-Mayor (Mr. E. Blackall) presided.

At present, Fore Street, the main thoroughfare, is lighted by electric arc lamps; and the question to be decided was whether certain neighbouring roads in which cables had been laid should be lighted by electricity or gas. The matter was considered by a Joint Committee appointed for the purpose. An estimate of the cost of lighting these streets with gas and electricity was submitted to the Special Committee. The Electrical Engineer (Mr. Spark) proposed that 40 flame arc lamps should be put up, and that the charge for these and for the existing arc lights should be £12 10s. per annum. Mr. J. W. Buckley, the Gas Engineer, submitted an estimate of the cost of lighting by gas, in which 64 lamps, with three incandescent burners in each, would be employed; the charge being £6 4s. 8d. per lamp. The cost for the 40 arc lamps would thus be £500 per annum, as against £399 for gas. The advocates of electric lighting, however, urged that the difference in the actual charge would be less than this, owing to the reduction in cost of the lighting of Fore Street from the present rate of £22 10s. to £12 10s. On the other hand, it was pointed out that if electric lighting were adopted the arrangement of the arc lamps would necessitate the retention of 12 of the present gas-lamps at a cost of £43 10s. per annum. The Joint Lighting Committee recommended the adoption of gas lighting; and the Surveyor's Committee, who have charge of the streets, endorsed the recommendation.

In moving that the minutes of the Committee and of the Gas Committee be confirmed, Alderman W. J. Waycott (the Chairman of the Surveyor's Committee) said it was something like three years since it was felt that the lighting of certain streets required attention; and the Special Committee were appointed to consider the question. From the beginning, the matter had resolved itself into a competition between the Electrical Committee on the one hand and the Gas Committee on the other. He felt in an exceedingly delicate position. Both the electricity and the gas works were the property of the Corporation; and it was not desirable to laud too highly one system of lighting at the expense of the other. Both mediums of lighting were excellent; and the adoption of one or the other was a matter of taste in very great measure. The Committee recommended the Council to adopt gas lighting. Some years ago electricity was thought more of than it was to-day; and there was an idea that it would supersede gas. Well, it had not done so either in Devonport or elsewhere. Gas had held its

own, and so far as they could see was likely to do so. The matter of cost was gone into as nearly as possible, but he did not think he need enter into this question. If they were to take the statement of the electrical authorities as to candle power, and put it against the statement of the gas authorities, with the prices submitted by each, undoubtedly electricity would have the advantage, and would appear to be the cheaper. This was not the view which the Committee had taken. They thought candle power was somewhat misleading, and that they could scarcely be guided by it. It resolved itself into a matter of satisfactory lighting. He asked them to put candle power out of their minds altogether, and to focus their attention on the fact that they wanted the leading thoroughfares well lighted, and in such a manner that people would praise them for it. They wanted to brighten up the town; and the Committee were convinced that the lighting which the Gas Committee proposed to give on the terms submitted would be perfectly satisfactory to all. The Gas Committee had had a good deal of up-hill work; and they had got a very nasty thing to face in the loss of a big customer in the Government. Gas had had a check by losing the business of supplying the Dockyard; and he thought it the duty of the Council to stand by the undertaking—seeing that gas was able to give them what they required.

In seconding the motion, Alderman Hornbrook said the Gas Committee were going on very well with the improvement of the public lighting; and they were paying for it out of revenue. In less than six months, every lamp would be changed from the old flat-flame to the incandescent system. There would not then be a better lighted town in England than Devonport. This recommendation was adopted by the Joint Lighting Committee by 6 votes to 3; it was confirmed by the Surveyor's Committee by 12 votes to 2; and at the meeting of the Gas Committee, there was not a dissentient voice. The Chairman of the Electrical Committee, who was at the meeting of the Gas Committee when the question came up, left before the vote—an indication of absolute surrender. Some years ago, electricity did seem to threaten to extinguish gas; but science had since unfolded some of her secrets, and in his opinion they had only just begun to tap the resources of incandescent lighting. The speaker then referred to the preference shown for high-pressure gas lighting in the City of London, and to the fact that the Liverpool Corporation (though owners of the electricity undertaking, while the gas-works belonged to a Company) had decided not to extend electric lighting in the streets. With regard to the price, he would be perfectly frank with the Council. They could not afford to give gas away until they had paid off their loans; and they accordingly charged a fair and proper price, and made a profit of 7d. per 1000 cubic feet. There were gas committees who supplied gas for street lighting at less than cost price—some did it for nothing. They, however, could not afford to supply Devonport on these terms now, though they might be able to do so by and by. The Electrical Committee had been a little unfair in not telling the Committee what profit they would make on the lighting, and they had also been unfair in another respect. The Committee offered to supply arc lamps for £12 10s. per annum. They could not do this and get a fair profit as they intended to do out of the gas. If the Electrical Committee charged according to their present price, the amount would be £684 per mile; but what they proposed to do was to bring it down to £218 per mile.

The Chairman of the Electric Committee (Mr. Banbury) said they were asked to believe that his Committee were quoting a losing price, while the Gas Committee were going to make a profit of 7d. per 1000 cubic feet. In Stonehouse, where gas was 1s. 9d. per 1000 cubic feet, the charge for lamps with double incandescent burners was £6 per annum, whereas in Devonport the Gas Committee were only going to charge £6 4s. 8d. for three-light incandescent lamps. This did not appear to tally altogether with the statement as to the profit to be made. He was opposed to the motion, not because he was biased in any way, but because he believed in the comfort and uplifting of the town, and adding to its importance. It was not the fact that the price of £12 10s. per arc lamp was an unknown rate. At Bradford and Chesterfield the charge was £12 10s., at Peterborough £12; and there were lower quotations, even down to £10 per lamp. He maintained that, taking all the figures into consideration, electricity would be cheaper than gas, while the candle power would be more than double.

Mr. Tarn complained that the electric lighting in Fore Street was inefficient, and said that if this was a sample of what the Electrical Committee could do, he was going to vote for gas. The real question was that of the efficiency of the lighting, not the candle power on paper. Mr. Bartlett said the Electrical Committee appeared to be offering current at about 1½d. per unit, whereas the cost was from 4d. to 4½d. per unit; and if this were so, somebody was suffering an injustice. The gas undertaking was burdened with a large amount of capital; and it would be extremely unwise for the Council to risk the possibility of delaying the redemption of the capital. Mr. Pole thought the arguments came to this—that gas lighting would cost £127 additional, and electric lighting about £98. He was quite persuaded that 60,000-candle power in electric light was far more efficient than 27,000 candles in gas. Mr. Coombs also was surprised to hear statements in favour of gas, and was convinced that they would make a mistake if they lit the streets by this means. He mentioned that electricity was cheaper than gas, and that the people in the thoroughfares they were considering had as much right to electric lighting as those living in Fore Street. Mr. Paul said that the competition of the Electrical Committee was not fair, for the charge was based on a figure at which it was not possible to produce the current profitably. Alderman Littleton remarked that the Gas Committee had certainly improved the lighting of the town generally, though they had not reduced the price of gas as it was anticipated they would. If they could get efficient lighting at a cheap rate, it was their duty to do so.

After several other members had spoken, a vote was taken, when the resolution in favour of gas lighting was carried by 32 votes to 9.

The Directors of Stewarts and Lloyds, Limited, have decided, after setting aside £70,000 for depreciation, to recommend the declaration of a dividend for the half year ended Dec. 31 at the rate of 11 per cent. per annum on the ordinary shares, the placing of £25,000 to the reserve fund, and carrying forward £61,000.

PROVINCIAL GAS AND WATER COMPANIES.

Gas.

Slot Meters Help Profits at Dover.

At the half-yearly meeting of the Dover Gas Company on Monday last week, the Directors reported that, after making the usual allowance for the sinking fund and depreciation, and paying the full statutory dividend at the rate of 7½ per cent. per annum (less income-tax), there would be a surplus of £438. They explain that this would have been larger but for the falling off in the value of residuals and the expenses attending the repair of one of the holders. A satisfactory feature of the report was the statement that the prepayment meters proved a valuable mode of supplying gas, and a source of profit to the Company. The Chairman (Mr. Willsher Mannering), in moving the adoption of the report, said the figures in the accounts for the past half year were not quite so favourable as those for the corresponding period of 1905, owing to increased expenditure and slightly decreased receipts. Nevertheless, there was a net profit of £4000, of which the statutory dividend would absorb £3562; leaving a balance of £438. The Chairman compared in detail the various items, and went on to say that during the half year the number of prepayment consumers had increased by 90; the total number at the end of the year being 3611. The quantity of gas supplied through the meters was 27,258,200 cubic feet, or equal to 24·4 per cent. of the total sales. An analysis of the working during 1906 showed that 22,870 tons of coal were carbonized and the quantity of gas sold was 233,334,100 cubic feet. The total number of consumers at the end of the year was 6365; and the number of cooking-stoves and heaters on hire was 5184. The financial result was a surplus of £1063, after providing for the full parliamentary dividends. He was pleased to add that the staff continued to discharge their duties with care and efficiency; and the officers and men worked harmoniously together. They took a good deal of interest in the affairs of the Company; and he believed they did what they could to promote its prosperity. Mr. Bottle seconded the motion, and it was carried unanimously. Replying to a vote of thanks to himself and the Directors, the Chairman proposed a similar recognition of the services of the Secretary (Mr. G. Fielding) and the Resident Engineer (Mr. R. Herring), whose acknowledgment of the compliment brought the proceedings to a close.

Growth of Gas Supply at Enfield.

At the recent half-yearly meeting of the Enfield Gas Company, the Chairman (Sir Alfred Somerset, K.C.B.), in moving the adoption of the report, in which a dividend at the rate of 5½ per cent. per annum on the consolidated ordinary stock was recommended, directed attention to the evidence afforded by the accounts submitted that the Company's business had grown at a considerable rate during the six months ending Dec. 31. He said that those who knew Enfield, the affairs of the Company, and the condition of the gas industry generally, twenty or five-and-twenty years ago, were aware that they were greatly changed—whether for the better was a matter of opinion; but that great strides had been made in the prosperity of the Company and in gas matters all over the country and throughout the world, no one could gainsay. The great advance made in all appliances for using gas, whether for lighting, cooking, power, or heating purposes, were steps on the way to the achievement of still better, more efficient, and more economical results. Never before had there been so many highly trained scientists engaged in the gas industry; and, under such circumstances, it would be rash to say that the high-water mark was reached with the discovery of the incandescent mantle. Mr. Alfred Ford, in seconding the motion, mentioned that the quantity of gas sold during the half year exceeded by more than 9 million cubic feet—or 11·22 per cent.—that sold in the corresponding period of 1905. The total number of consumers was 7161, and there were 5218 cookers in use. The report was unanimously adopted. In the course of the subsequent proceedings, the General Manager and Secretary (Mr. C. W. Offord) expressed his thanks for the increased remuneration which had been unanimously voted to him; and the Engineer (Mr. W. A. Valon), in acknowledging a vote of thanks to the staff, took the opportunity of pointing out to the shareholders that a very favourite plan adopted by some careless advocates of electricity was to compare the best form of electric lighting with the worst form of gas lighting, in order to bolster up a misstatement. But the truth remained that, comparing the best form of electricity with the best form of using gas for lighting purposes, the difference in cost was in Enfield many times more. There was, no doubt, a field for electricity. Well, let the electricians occupy it. Certainly public lighting was not that field.

Extensions and Reduced Price at Farnham.

At the annual general meeting of the Farnham Gas Company, Limited, the Chairman (Mr. A. J. Nash) submitted a most satisfactory report and balance-sheet for the twelve months ending the 31st of December last. The former showed that during the year new boilers, condensing plant, and station meter had been supplied, and the washing and scrubbing appliances enlarged, at the works—amounts equivalent in value to the old apparatus displaced being charged to the revenue account; and it was intimated that practically the whole works had now been modernized, and were in a high state of efficiency. During the twelve months, 4569 tons of coal had been carbonized, producing 52,133,000 cubic feet of gas, or a yield of 11,410 cubic feet per ton. The coke and breeze actually saleable was 10·3 cwt. per ton of coal. The report was adopted, full dividends were declared, and it was decided to reduce the price of gas to 3s. 4d. per 1000 cubic feet as from the 1st of January last. The Engineer and Secretary (Mr. S. J. Symonds) was congratulated upon the results obtained, and recognition of his services was suitably made.

Improved Working at Hastings.

In the report presented by the Directors of the Hastings and St. Leonards Gas Company at the extraordinary general meeting last Thursday, they stated that the development of the new works at Glyne Gap, which have been described in our columns, was proceeding satisfactorily; and it was hoped that the whole of the manufacturing operations would be transferred there during the present half year. After

some reference to the result of the arbitration proceedings between the Company and the Tramways Company in regard to the mains along the Front, which has already been recorded, the Directors state that the accounts for the six months ended Dec. 31 last showed a profit balance of £12,244; and they proposed to pay the statutory sliding-scale dividends (less income-tax)—viz., £6 10s. per cent. per annum on the 5 per cent. converted stock; £5 per cent. per annum on the 3½ per cent. converted stock; and £6 1s. per cent. per annum on the 5 per cent. additional stock—and carry forward the balance. In moving the adoption of the report, the Chairman (Dr. G. G. Gray, J.P.) said the value of the gas sold in the six months covered by it showed a decrease of £1476, compared with the corresponding period of 1905; but he reminded the proprietors that in the past half year the price of gas was 1½d. per 1000 cubic feet less than in the latter half of the previous year. Of the £1476, they had already recovered £1300. The total decrease in revenue was £1525. On the other hand, there had been increases of £389 from meters and stoves, and £1555 from residuals (£1314 being for coke, due to the economy in fuel effected by the improved methods adopted at the new works); the total increase being £1952. There was consequently a net increase of £427 in the revenue, the total of which was £44,730. Dr. Gray next reviewed the expenditure side of the revenue account. He said the outlay on coal, tar, &c., showed a decrease of £221, which was the result of not having to pay the coal-duty. But against this they had the £1476 decrease in the value of the gas sold. Under the head of purifying, a saving of £82 had been effected; wages showed a drop of £544, due to the improved method of manufacture at the new works, which was exceedingly satisfactory; and rates were £34 less, owing to the reduction in the poundage. The report was adopted.

Prosperity at Holmfirth.

For the first time in the seventy years' history of the Holmfirth Gaslight Company, a dividend of 10 per cent. per annum was declared at the recent annual meeting of shareholders. During the past four years, the sum of £2500 has been expended out of revenue on bringing the works up to date; while a similar sum has been spent in a like manner in adding 500 consumers to the books. The Chairman and several of the Directors spoke of the untiring energy displayed in the management by the Engineer and Secretary (Mr. A. E. Buckley).

Advance at Ilfracombe.

It is gratifying to learn that the enterprise of the Ilfracombe Gas Company in removing the works from the centre of the town to a new site in the suburbs, has been justified by results. The report presented to the shareholders at the annual meeting last Wednesday, was one of satisfactory progress, in which the results obtained in recent years were referred to as having fully realized the expectations formed when the capital expenditure was undertaken. At the end of last year, there were 2282 customers on the books, an increase of 91 during the twelve months; while the cooking-stoves on hire have reached a total of 754, an increase of 61. The village of Coombe Martin, to which the mains were recently extended, now has 213 meters and 96 cookers; and the Chairman (Mr. R. Lake) spoke of it as bidding fair to be a valuable asset of the Company. The accounts showed an available balance of £3954; and the statutory dividends of 5 per cent. on the preference and ordinary stocks were declared. The Chairman referred to the economy which had characterized the expenditure, and as to the income remarked that, while the ordinary sale of gas increased, the quantity used for the public lamps was less owing to the number of lighting hours being reduced. With regard to the price of coal, he said the Company were in the satisfactory position of having made good contracts till Michaelmas next. In the course of the discussion, some of the shareholders suggested that the price of gas should be reduced; and an undertaking was given that the matter should receive attention as soon as the condition of affairs justified it. Mr. Lake was re-elected a Director; and a special tribute was paid to the interest he had for many years shown in the Company. Mr. W. Ball, the Secretary, Mr. Armstrong, the Manager, and the other officials were heartily thanked for their services.

Keeping Abreast of the Times at Redhill.

The Directors of the Redhill Gas Company recently presented to the proprietors the 47th annual report and accounts, which showed that the working in the past year had produced a profit on the revenue account of £7632, and that a sum of £8954 was available for distribution. They recommended the declaration of a dividend of 10 per cent. on the share capital, and of 5 per cent. on the "B" stock, which would leave a balance of £1710 to be carried forward. The Chairman (Mr. G. R. Hunt), in moving the adoption of the report, said the period covered by it had been a busy one in connection with the renewal and extension of the mains and works. The retort-house about to be erected on the occasion of the last meeting was nearly finished. It was 87 feet long and 63 feet wide, and contained a retort-bench of six arches, three of which were already filled with beds of 14 retorts each, making a total of 42 new retorts. They had put down four new purifiers of improved construction, erected a new washer-scrubber, with engine, and laid four miles of mains to South Nutfield. He thought, if the proprietors looked round the works, they would agree with him that much improvement had been effected in them during the past five years. Their Engineer and General Manager (Mr. James Paterson, M.A.) reported that with their present plant they were in a position to meet any demand that might be made. They were now taking gas to a new district—Walton-on-the-Hill—from which they had received many applications from inhabitants to be supplied with gas. The prepayment meter business was rapidly increasing in importance in their accounts. The Company supplied both penny and shilling in the slot meters, the latter being chiefly used in the better class of house, or by small shopkeepers. The cooking-stoves, which were always supplied with these meters, had also increased in popularity of late years; and the Directors were now making special arrangements for the supply of gas for engines, and they had no fear as to retaining the custom they had hitherto received from consumers in this respect. The report was adopted. Replying to a vote of thanks to the Chairman, Directors, and officials, the Chairman assured the proprietors that they would do all they could to promote the prosperity of the Company. With regard to the officials, they had in Mr. Paterson a very competent Engineer, and one who was always trying to save the expenses of the Company as much as possible. With regard to Mr. Long (the Secretary) he had been with the Company a number of years, his heart was in his duties, and the whole staff worked very amicably together. Mr. Paterson acknowledged the compliment on behalf of the staff. In regard to the works, he pointed out that the time always came, with a progressive gas company, when even half-a-dozen extra retorts would require a new house to put them in—that was to say, one required to make a new house to get a small amount of extra retort power. They now had the house, and from time to time they would be able to increase their manufacturing capacity by putting in extra retorts at small expense as the progress of the district required.

Cheaper Purification and More "Slots" at Richmond.

In moving the adoption of the report at the recent half-yearly meeting of the Richmond Gas Company, the Chairman (Mr. T. J. Carless) remarked that £800 had been spent at the works on a further installation of retorts on the regenerative system. With regard to the expenditure on revenue account, he mentioned that coal had cost somewhat less, owing principally to the smaller quantity used and the excellent carbonizing returns; the gas sold per ton of coal used being in excess of the corresponding period last year. Purification showed a satisfactory reduction in cost, owing solely to abandoning the use of lime, which had benefited alike the people in the neighbourhood of the works and the men employed in changing the purifiers. The sum receivable for gas had been slightly affected by the mild and bright weather of the autumn and by the growing use of the incandescent burner, but he was satisfied that the business of the Company was as sound as ever. The prepayment system had largely increased during the half year; the returns of gas sold under this head being 11½ per cent. in advance of the figures for the corresponding period of 1905. The report was adopted, and a dividend at the rate of 5¼ per cent. per annum for the half year was declared. The proceedings closed with votes of thanks to the Directors, Mr. Thomas May, and staff.

Another Increase at Southend.

The report for the half year to Dec. 31 which was adopted at the annual meeting of the Southend Gas Company last Tuesday stated that the increased sale of gas over the corresponding period of the previous year was 14,178,900 cubic feet, equal to 10·89 per cent. The number of consumers on Dec. 31 was 9726 (of which 6261 were automatic), being an increase for the half year of 265. The profit and loss account showed a net amount available for dividend of £9398 (after writing £1500 off automatic meter house-fittings account, and placing £750 to the credit of the reserve fund account); and it was recommended that dividends be paid on the original and new ordinary stocks at the rate of 5¾ per cent. per annum, and on the new ordinary "B" stock at the rate of 5⅝ per cent., less income-tax. This amounted to £5618, and left £3780 to be carried forward to the next account. During the half year the Rochfort Union had re-assessed the Company's works and distributing plant at a figure which the Directors felt they could not accept. Notice of objection had therefore been served; but it was hoped that a compromise might be arrived at, thus avoiding an appeal to Quarter Sessions. The report of the Engineer and Manager (Mr. Francis Clark) showed that 1 mile 546 yards of new main-pipes had been laid, making a total of 55 miles 692 yards. In addition to this, 421 new cookers had been fixed, 680 houses supplied with automatic fittings, and 669 cookers repaired in the Company's workshops. The Chairman (Mr. C. F. Woosnam) said that, although over 14 million cubic feet more gas had been made, the manufacturing charges were less. Coal had cost them more; and he regretted that they had been obliged to make the new contracts at a considerable further advance. He was afraid they would have some difficulty in giving such a good balance-sheet next half year; but they hoped, by very careful working, to have the same dividend, and to keep down the price of gas. The make of gas per ton of coal, he mentioned, was 11,404 cubic feet; and the unaccounted-for gas was 4·61 per cent.

Burden of Rates at Stretford.

The accounts presented at the half-yearly meeting of the Stretford Gas Company, on Monday last week, showed a profit of £5775 for the six months ending the 31st of December. Adding £2116 brought forward, the amount available for distribution was £7891. The Chairman (Mr. W. Lewis Galloway), after commenting upon the satisfactory balance-sheet and the efficient and up-to-date condition of the works (which are under the supervision of Mr. H. Kendrick), proposed the declaration of dividends at the rates of 10, 7½, 7, and 5 per cent. per annum on the several classes of shares. After the payment of these, there would be left, he said, a balance of £2981 to be carried forward. The motion was duly seconded by the Deputy-Chairman (Mr. W. A. Nicholls), who, in the course of his remarks, which were directed mainly to the refutation of attacks which had been made upon the Company in a local paper, referred to the subject of rating. He said the incidence of taxation was a matter requiring attention. It pressed hard on gas consumers, for the works and plant were heavily rated, and so much more was taken out of the pockets of the consumers to keep down the rates of those who did not burn gas. There seemed to be a great want of system in the fixing of the rateable value; and during the past decade the amounts paid to the various rating authorities had gone up out of all proportion to the value of the property. In 1896, the Company sold 184 million cubic feet of gas, and paid £1356 in rates and taxes. In 1906, the sales were 325 millions, and the amount paid was £3186. The cost per 1000 cubic feet of gas sold being in the former year 1¾d., and in the latter one 2¼d., a direct burden was put upon the poorer classes and those least able to bear it. If these charges could be reduced to something like reasonable figures, it would mean cheaper gas; and cheaper gas meant less smoke and a cleaner atmosphere, as very much more would be used for heating and cooking, and the Millennium of gas makers and local authorities alike would be in sight. To put the charge in another form, the Company paid in rates, &c., 6s. 5¾d. in the pound on their dividends, while the Government tax was only 1s. in the pound. A great many people besides themselves were of opinion that the gas industry was taxed far more than it ought to be, while others, started for a similar purpose, were charged far less. The motion was carried.

General Increase at Swindon.

At the recent annual meeting of the Swindon United Gas Company, the Directors reported steady progress in the sales of gas, which had increased by about 5 per cent., notwithstanding the competition of the electric light. The balance of the profit and loss account admitted of the usual dividends being paid. The Chairman (Mr. W. H. Ludgate), in moving the adoption of the report, stated that during the past year the consumption of gas had been as follows: Ordinary meters, 71,070,200 cubic feet; slot meters, 69,546,300 cubic feet; and public lighting, 9,050,600 cubic feet—making a total of 149,666,100 cubic feet, or 6,378,800 cubic feet more than the consumption in 1905. The increase was to be found in all departments, but more particularly in the slot meters. The money value was: Gas for ordinary purposes and public lighting, £14,011; consumption through slot meters, £12,240—total, £26,251, or an increase of £1406. The consumers now numbered, 8706; being an increase of 466, the majority of them being users of slot meters. In fact, there were three of these consumers to one ordinary one. The total receipts amounted to £35,677, and the expenditure to £26,833. The net balance was £7844, or an increase of £344. An interim dividend had been paid, and there was a sum of £3440 available for distribution. The Directors had decided to recommend the payment of dividends at the usual rate of 5 per cent.; but on this occasion it would be free of income-tax. This would absorb £3141, and leave a balance of £299. The report was adopted.

Low Price, Good Business, and More Capital at Watford.

At the recent half-yearly meeting of the Watford Gas Company, the Directors reported that the profit on the working in the six months ending Dec. 31 last amounted to £3338, and that a sum of £6596 was available for distribution. They recommended the declaration of dividends at the rates of 7½ and 5⅝ per cent. per annum on the "A" and "B" stocks respectively, less income-tax. They drew the proprietors' attention to the fact that, notwithstanding the reduction in the price of gas, they had been able, largely through the increased demand, to recommend the payment of dividends on the converted stocks equivalent to those paid on the old stocks for the past three half years. In moving the adoption of the report, the Chairman (Mr. E. J. Slinn) pointed out that by reducing the price of gas 2d. per 1000 cubic feet they had saved the consumers £850. The price at which they now sold gas was lower than in any place in Hertfordshire, where it varied from 5s. 10d. to 2s. 8d.—Watford's price. In Middlesex, the highest price was 3s. 9d. and the lowest 2s. 8d. What was more remarkable, in the Midlands, where the coalfields were, the price ranged from 3s. 6d. down to 2s. 8d. He, therefore, thought their record for cheap gas was extremely good, and he pointed to the very careful work of all connected with their establishment, who got the best possible results out of their coal, and managed the whole concern in the most economical manner. The interests of the shareholders and consumers were certainly identical. With regard to the rates, 5 per cent. of the 2s. 8d. consumers paid for each 1000 cubic feet of gas went for rates. He did not know whether any other business had to pay as much as this. The report was adopted. At the close of the ordinary business, a special meeting was held at which the Directors were authorized to raise additional capital not exceeding £25,000.

Water.

Increased Revenue and Good Prospects at Bristol.

In the report which the Directors of the Bristol Water Company presented at the recent annual general meeting, they stated that the revenue from water-rates for the past year was £150,732; being an increase of £1780 on that of the previous year. The net sum shown by the revenue account (including £3298 brought forward) to be applicable for dividend on the ordinary capital was £66,876. Out of it the Directors paid an intermediate dividend at the rate of 7½ per cent. per annum on the ordinary shares and 5¼ per cent. per annum on the 7 per cent. maximum consolidated ordinary stock; leaving a balance of £36,389 for distribution. The Directors recommended the payment of final dividends at the respective rates of 8 and 5⅝ per cent. per annum; leaving a balance of £3427 to be carried forward. Owing to the accidental bursting of one of the large mains of the Company in Redcliff Street, very heavy claims for damages to goods and premises were made upon the Company; and a test action was brought by a local firm and tried at the Bristol Assizes in July.* The hearing resulted in a verdict in the Company's favour. The capital expended during the year was £31,688. In moving the adoption of the report, the Chairman (Mr. H. N. Abbot) said that though the increase in the amount of water-rates for the past year was less than for 1905, owing to the slump in the building trade and the large number of void houses, they looked for improvement this year. The Company were in a very strong position as regarded the quantity of water at their command; indeed, they could supply double the amount at present consumed, although last year their consumption had gone up about 250,000 gallons a day. They now supplied something like 9½ million gallons daily to the city; but with the springs at their disposal they were equal to a demand of 17 millions. From this the shareholders would see that the Company were well ahead of present requirements; and with the natural growth of the city they might look forward to bringing back the dividend to the time-honoured 10 per cent. Dealing with the bursting of the main in Redcliff Street, he said the Company were bound to defend themselves against the action brought, because a great principle was involved; and as they had some 400 miles of mains, it was absolutely necessary to meet the case. Though they had won the action, the costs, beyond those they received from the other side, amounted to £1980; but they had successfully reasserted a principle of the utmost importance, and he thought the shareholders would agree that, under the circumstances, the money had been well spent. The Directors felt they should voice the shareholders' thanks to the officers of the Company—to Mr. Alexander (the Secretary) first and foremost; to their excellent Engineer (Mr. J. A. MacPherson, M Inst.C.E.), who grew so much on acquaintance; to Mr. Gerrish, their able legal adviser, who had assisted them so much to weather last year's storm; and, finally, to all the other officers, clerks, and staff, on whom they depended so much. The report was adopted. At the close of the ordinary proceedings, a special meeting was held at which the shareholders sanctioned the issue of £9552 of 3½ per cent. debentures, part of the sum of £70,000 authorized by the Act of 1902.

* See "JOURNAL," Vol. XCV., p. 250.

Higher Expenditure and Increased Rates in South Staffordshire.

The report presented at the 108th half-yearly meeting of the South Staffordshire Water Company, recently held in Birmingham, under the presidency of Mr. Frank James, showed that the number of houses laid on in the six months ending the 31st of December last was 1513; making the total supplied 131,057. The gross amount of water-rates was £70,307, against £67,121 in the corresponding period of the previous year. The Directors transferred £2000 to the depreciation fund, raising it to £24,001. After providing for interest on the debenture and preference stock, the amount remaining for distribution (including £6469 brought forward) was £29,360; and the Directors recommended the declaration of a dividend for the half year on the ordinary stock at the rate of 7 per cent. per annum, less income-tax. The amount of the dividend being £22,111, there remained £7249 to the credit of the current half year. In moving the adoption of the report, the Chairman, turning to the profit and loss account, remarked that on the debit side, with a single exception, all the charges were in excess of the corresponding ones for 1905. Engine charges were higher on account of the greater consumption of coal at the pumping-stations. Wages and other things were higher; but many million gallons more water had been pumped. The maintenance account was larger by £1020; and rates—his old friend, about which he was tired of talking—showed an increase of £213. When they would stop growing he did not know. There was, however, one bright spot on the debit side; the law expenses and charges were less by £516. Water-rates were £3186 in excess of those at the corresponding period of 1905; and the net increase was £444. He concluded by asking the shareholders to confirm the recommendation as to the payment of a dividend at the rate of 7 per cent. per annum, at a cost of £544 more. Alderman Beale seconded the motion; and it was carried.

Five Years' Progress at Woking.

At the half-yearly general meeting of the Woking Water and Gas Company on Monday last week, the Directors reported that the balance at the credit of the profit and loss account was £4506, out of which they recommended the payment of a dividend at the rate of 4½ per cent. per annum for the six months ending Dec. 31 last, less income tax, which would absorb £3596, and also that £150 should be written off the suspense account—leaving £760 to be carried forward. In moving the adoption of the report, the Chairman (Sir John Baker, M.P.) said the result of the six months' working was a profit of £4888, against £4598 for the corresponding period of 1905—an increase of £290. The revenue from water-rental was £7794, compared with £7119; showing the very satisfactory rise of £675. The expenditure on revenue account amounted to £3164, against £2834, mainly in consequence of repairs to works and increased assessments. A return of the new consumers obtained during the past five years showed that the Company were on the road to increased prosperity. In 1902 there were 392 new house supplies and 40 new meter supplies; in 1903 the figures were respectively 421 and 43; in 1904 they were 530 and 56; in 1905 they were 408 and 50; in 1906 they were 336 and 53. The net water-rental had risen in the five years from £10,859 to £15,237—a total of £4378, or a yearly average increase of £875. If they could continue at the rate of about £1000 a year, he thought they ought to be well satisfied. It would encourage the Directors to again increase the dividend, and probably, after a short interval, to give the shareholders 5 instead of 4½ per cent. Mr. Baynes seconded the motion. Mr. Pain said he should have liked to hear something with regard to the purchase by the Guildford Corporation of part of the Company's undertaking. Was the money to be applied in reduction of the capital value in shares or debentures? The Chairman said he had omitted mention of this matter advisedly, because the Arbitrator (Sir John Wolfe-Barry, K.C.B.) was still sitting. He might say that the revenue derived from the portion of the undertaking they were parting with was about one-ninth of the whole. At the request of the Chairman, the Secretary (Mr. B. Dennett Holroyd) read the clause in the Act of 1899 providing that the money received from the sale should be employed for the capital purposes of the undertaking. The motion was carried unanimously.

CAGLIARI GAS AND WATER COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held on Tuesday afternoon last, at the Offices, No. 11, Ironmonger Lane, E.C.—Mr. FREDERIC WILLIAM BLUNT in the chair.

The SECRETARY (Mr. W. B. Peat) read the notice convening the meeting; and the Directors' report and the accounts were taken as read. The report stated that the income on revenue account for the past year amounted to £29,436, and the expenditure (including £200 to sinking fund) to £14,506—leaving a net profit available for distribution of £14,930. The total amount available, including the balance of £5265 brought forward from the previous year, was £20,195. Out of this an interim dividend at the rate of 6 per cent. per annum was paid for the half year to June 30; and the Directors recommended the declaration of one at the rate of 8 per cent. per annum for the last six months, making 7 per cent. for the year. They also recommended that a bonus of 5s. per share be paid. These payments would absorb £12,375; and after crediting £1000 to the reserve fund, there would be a balance of £6820 to be carried forward. The income for the year showed an increase of £1389; while the expenditure was £1048 more. The unaccounted-for gas averaged 5·2 per cent. of the make over the whole year. The Directors were much gratified with the work that had recently been carried out for increasing the supply of water to the city and the villages by cleaning the main. The result had been most satisfactory. The concession for the supply of gas would terminate in another year; but negotiations were proceeding with the authorities as to a renewal.

The CHAIRMAN said his first duty was to express the Board's great regret at the absence of the Chairman of the Company (Sir John Aird). He was unwell; and he (the speaker) was afraid that his illness had been a little bit aggravated by the shock of another loss that the Company had sustained. It might be in the knowledge of those present that Sir Frederick Wigan, who had been a Director of the Company from its very commencement, died suddenly in London on the previous Saturday. He should like to say that Sir Frederick was a gentleman whom any Board might be proud to number among their members. He was a man of broad and liberal views, combined with excellent business judgment. He was a loyal colleague; and he never hesitated to use his considerable money power in support of a policy for which his financial strength was necessary. Turning from these regrettable subjects to the report and accounts, there was very little that need be said. The accounts for the past year were satisfactory. The receipts both for gas and water showed a small increase; and the representatives of the Company in Cagliari appeared to have given every satisfaction to the city authorities during the year with regard to the manner in which they had conducted the Company's business. They had also had the great advantage again of the assistance of their good friend Mr. Simmelkjör—who, by the way, he might say, had completed his fortieth year with the Company since the last meeting. The dividend proposed was at the same rate as it had been for the past three years. The increase in the supply of gas would have been greater if the urgent works which were required for augmenting the make and the storage had been carried out; and the Directors were anxious, from this point of view, that an arrangement with the authorities about the extension of the concession should be come to definitely. The shareholders would understand that it was impossible to incur any serious outlay while the negotiations, and the uncertainty they involved, existed; but if these negotiations were carried successfully through, certain works would be put in hand that would ensure a better supply of gas to the inhabitants of the city. As regarded the water department, arrangements were made during the past year for scraping the leading main down from the reservoir to the city. He was a little sorry the expression "cleaning" found its way into the report, in case it should convey to anyone the impression that there was foulness in the main. What was scraped off was really a metallic incrustation, which naturally retarded and diminished the supply. The operation was carried out most carefully, and with very beneficial results; for the increase in the delivery of water to the city and villages in consequence of it was no less than about 50 per cent. It was also satisfactory to think the work was completed without any accident or delay in delivery of water to the city, although it involved dividing the main up for the time being into sections. A portion of the expenditure on this work—£703—would be found debited to the maintenance of water-works account; and this, he thought he was safe in saying, was more than half the total cost. The reservoir, mains, and filter-beds were in good order; and the supply to the villages during the past year had increased. There was also an increase of perhaps a rather remarkable amount in the "sundry work and sales of material" item, which was £224 for the previous year, and this year was £605. This was, the Board understood, to some extent due to a large number of new buildings having been erected during the past twelve months, so that there was a good deal of work in the way of fitting to do in connection with them. He concluded by moving the adoption of the report and accounts.

Mr. W. R. GALBRAITH seconded the motion; and it was carried.

On the proposition of the CHAIRMAN, seconded by Mr. A. G. BURNEY, the interim dividend at the rate of 6 per cent. per annum which was paid last July was confirmed, and a dividend at the rate of 8 per cent. per annum for the half year to Dec. 31 was declared, together with a bonus of 5s. per share, less income-tax.

The CHAIRMAN proposed, and Mr. S. SIMMELKJÖR seconded, the re-election of the retiring Directors (Mr. John Aird and Mr. W. R. Galbraith); and this was carried.

The CHAIRMAN said he should like to propose that the thanks of the meeting be accorded to Mr. Sanna, in Cagliari, and his staff, for their efficient conduct of the business of the Company. The Board had had no reason during the year to alter their opinion as to the extremely satisfactory manner in which Mr. Sanna superintended the Company's work, or the way in which he controlled those under him, and induced them to do the same.

Mr. SIMMELKJÖR remarked that, knowing personally all the members of the staff, he had great pleasure in seconding the motion; and it was agreed to.

The Auditors (Messrs. Turquand, Youngs, and Co., and Mr. R. S. Robb) were re-appointed; and a vote of thanks was passed to the Chairman and Directors.

The CHAIRMAN, in acknowledging the compliment, said it had been a sad meeting, and the shareholders had done the Directors a kindness in not attending in larger numbers.

HARROW AND STANMORE GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Monday last week at the Albion Tavern, Aldersgate Street, E.C.—Mr. A. H. BAYNES in the chair.

The notice of meeting having been read by the ENGINEER and SECRETARY (Mr. J. L. Chapman), the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN said he hoped the proprietors had all read the report, because he thought the feeling would be that it was a very satisfactory one, announcing as it did continued success. He believed that the few figures he proposed to give would deepen this impression. The gas-rental for the half year had been £13,182—an increase of £1031 upon the corresponding period of 1905. The total quantity of gas sold during the half year was 68,622,000 cubic feet—an increase of 7,706,000 cubic feet, or 12½ per cent. The price of gas over the whole of the half year had been reduced by 1d. in the central area, and by 3d. in the outer area. Had these reductions not been made, the increase in the gas receipts would have been £1492, instead of £1003—a difference of £461. To-day, the price of gas for private consumers in the central area was 3d., and in the outer area 5d., less than it was at the end of 1905; and there had also been a corresponding reduction in the charge for public lighting. The quantity of gas made in the half year was 77,060,000 cubic feet, of which 50,073,000 cubic feet was coal gas, and 26,987,000 cubic feet carburetted water gas. The quantity of coal carbonized was 4626 tons; and the average yield was 10,824 cubic feet per ton. The receipts for coke and residuals amounted to £1959—an increase of £495 (after allowing £358 for coke used on the works for the manufacture of carburetted water gas), or an increase in the receipts of 33¾ per cent. The meter, fittings, and stove rentals amounted to £1180—an increase of more than 14½ per cent. Tar receipts had increased by 26 per cent., and sulphate receipts by 25 per cent. The total increase in the receipts had been £1633. Turning to the expenditure, it showed an increase of £1385 on the corresponding period of 1905, which was accounted for in this way: 688 tons more coal had been carbonized, costing £658; carbonizing wages had increased by £85; repairs to works, by £264; repairs to meters and stoves, by £207; and rates and taxes, by £115. Very considerable amounts had been written off stoves and meters for depreciation. The total profit for the half year was £4926—an increase of £248. The interest on debentures and loans required £565, and to pay the dividends recommended, there would be needed £4265; so that there would still be a small balance to carry to the amount brought forward. During the half year, they had added 336 new services for ordinary meters, and 536 for coin meters. The total number of ordinary consumers at present was 2668; and the number of coin meters fixed was 2475—together a total of 5143. During the half year, 8837 yards of mains had been laid, chiefly for new supplies, and some to replace smaller mains, which had been disconnected and written off in the item of repairs. He thought they would gather from this that, in nearly all the main features of the report, progress was shown. They were able from the earnings of the half year to pay the statutory dividend; and he did feel, considering all the circumstances, that they had good reason to congratulate themselves upon the present condition of the concern. He then formally moved the adoption of the report and accounts.

Dr. J. W. LEE GLAISHER seconded the motion, which was unanimously carried.

Moved by the CHAIRMAN, and seconded by Mr. HORACE J. RYDON, dividends were declared at the rates of 10 per cent. per annum on the original "A" capital, and 7 per cent. on the additional "B" and "C" capital and guaranteed shares, all less income-tax.

On the proposition of Dr. GLAISHER, seconded by Mr. RYDON, the Chairman was unanimously re-elected to his seat at the Board; and on the motion of Mr. F. LENNARD, seconded by Mr. SAMUEL CUTLER, the retiring Auditor (Mr. James Randall) was re-appointed.

In the course of his acknowledgment, Mr. RANDALL remarked that the balance-sheet was a record one; and he was sure the Company were only on the fringe of prosperity. They had a wide field; and Mr. Chapman would do his best to develop it.

The CHAIRMAN proposed a vote of thanks to the Engineer and Secretary. He said a great proportion of the progress of the Company was due to Mr. Chapman. He had displayed great ability in managing the Company's affairs; and his enthusiasm for work was unbounded.

Mr. F. J. SMITH seconded the motion, and it was agreed to.

Mr. CHAPMAN said, in responding for himself, he liked to feel he was also responding for his staff. He had a most faithful set of men about him, who took a great interest in the works and the Company's affairs generally. He was also pleased to say that some of the workmen had been with the Company for over thirty years; and this spoke well for those who had charge of the men and for the relationships between men and management. It would be seen from the report that their working was very excellent. In respect of fuel consumption and carbonizing wages, he did not think they were far behind companies very much larger in size. He was pleased indeed that the Company had been able to help the consumers; and also that the consumers had helped the Company. The Company had been reducing the price; consumers day by day had been increasing the use of gas for different purposes. They had now over 2000 cooking-stoves out on hire; and the smaller consumers, as well as the larger, seemed to rejoice in the stoves. The large reductions they had made—4d. per 1000 cubic feet in one part of the district and 3d. in the other part—would represent £600 to £700 less receipts for the Company. Consequently they would need to be careful, and hopeful that the consumers would try to do their best to help the Company.

On the proposition of Mr. A. W. OKE, seconded by Mr. WORTHINGTON CHURCH, the Chairman and Directors were heartily thanked for their services.

Authorization of New Capital.

An Extraordinary Meeting was then held to consider the creation and issue of additional capital.

The CHAIRMAN moved that the Directors be authorized to issue a further £30,000 of additional capital, and to borrow, by the creation of debenture stock, £10,000 in respect of such additional capital, in such manner and at such times as might be determined. He observed that the Company were progressing at such a rapid rate that it was absolutely necessary they should be in a financial position to cope with the additional demands.

Dr. GLAISHER seconded the motion.

Mr. OKE suggested that the resolution should embrace a discretionary power to the Board to raise preference capital. He thought it would be to the advantage of the existing shareholders if a portion of the stock was in the form of preference capital. The consumers, too, would indirectly benefit. After some years' experience, he had no hesitation in strongly urging the advisability of this.

The CHAIRMAN remarked that they sold both their ordinary and debenture stock by auction; and the conclusion the Board had arrived at was that it would be better to pass the resolution in the form in which he had read it.

The resolution was unanimously adopted; and the proceedings terminated.

THE CHARGE FOR WATER IN THE CITY.

Proposed Alterations by the Water Board.

At the Guildhall last Wednesday, there was a large gathering of citizens and ratepayers to protest against the proposals contained in the Metropolitan Water Board (Charges, &c.) Bill, as affecting the City. The Lord Mayor and Sheriffs attended in state. The Lord Mayor presided, and in opening the proceedings explained that the Water Board had promoted a Bill providing for a uniform scale of charges applicable throughout their area of supply. Those who held property in the City thought that this was not a fair arrangement; and it was in order that they might express their views that the Corporation had, on requisition, granted the use of the Guildhall.

The first speaker was Sir F. Banbury, M.P., who moved the following resolution: "That this meeting of owners and occupiers of business premises in the City of London strongly protests against the provisions of the Metropolitan Water Board (Charges, &c.) Bill in Parliament, introduced by the Metropolitan Water Board, which Bill, while professing to be merely a measure for equalizing the rates to be charged for water throughout the Metropolitan area, will in effect enormously increase the rates at present levied for water supplied to business premises in the City and elsewhere." He observed that the Act of 1902 provided that the Water Board should within a given time introduce into Parliament a Bill to make uniform the scale of charges in its area of supply. The words were "introduce into Parliament," and therefore the Water Board were obliged to introduce the Bill. There was, however, no obligation to do more than that, and as the Bill had been introduced, and had met with almost universal condemnation, they would have fulfilled their obligation if they took no further steps. One result of the Bill, if passed, would be to increase the charge for water practically in every district in London. The Bill went farther than the proposed uniform scale of charges. Among other things, it provided that the charge for water for trade purposes, which was so important in the City, could be raised to 1s. per 1000 gallons. The New River Company were obliged to supply water for trade purposes at from 6d. to 7d. per 1000 gallons. It was estimated by the Board that the sum obtained from these extra charges would not be sufficient by £21,000 to meet their obligations. If this were correct, it was evident that they could not refuse to exact the full charges which they asked for power to make. The Stock Exchange buildings between Throgmorton Street and Old Broad Street paid at present for water £530 a year; under the Bill, the amount would be £1750. For its outlying buildings the cost would be increased from £224 to £475. The leaseholders of offices in Austin Friars informed him that, whereas they were now paying £43 for their water supply, they would have to pay £101 under the Bill. There was no reason, if the Water Board managed their affairs in a businesslike and economical manner, why these proposed additional charges should be imposed, and the trade of the City injuriously affected.

In seconding the motion, Sir Felix Schuster contended that the Bill did not carry out the principle of equalization of the rates, but, on the contrary, placed an unfair burden on those who had to pay them in the City. Under the old arrangement, the rate charged by the New River Company was 3 per cent. on the gross assessment; but under the Bill it would be 5 per cent. He had a case in his mind where the water payment, at present £600 a year, would be £3500. The supply by meter had been at the rate of 1s. per 1000 gallons; but, as the result of a calculation made in one particular instance, it was found that if the Bill became law, and was acted upon, the rate would be 27s. per 1000 gallons. The trade in the City depended upon a large number of small traders, and to them the hardship would be a very real one. He thought the Bill would inflict an injustice which needed only to be pointed out to prevent its being passed.

The resolution having been carried unanimously, it was agreed that a copy of the resolution should be forwarded to the Government, the Corporation, the London County Council, the Metropolitan Water Board, and the representatives of the City in Parliament, and that the Corporation be requested to offer strenuous opposition to the Bill.

Paris in Partial Darkness.—Owing to a strike among the workmen employed by the new Company who have obtained the concession for the supply of electricity in Paris, the city was plunged into partial darkness last Friday night. It is stated by the correspondent of "The Times" that the cause of the strike is an alleged onerous arrangement for the workmen introduced by the Company; the principal grievance being the reduction by one-half of the pensions of retiring employees. The strike came as a surprise—none of the morning papers having announced it; and consequently it caused enormous inconvenience. All the theatres and places of amusement were closed. The cafés and restaurants, only a few of which have retained their gas-fittings, had recourse to candles. At the Palais de Justice, the Courts had to be suddenly closed; and the Bourse du Travail was shut in the evening by order of the authorities. The strikers, numbering about 2000, were to have held a meeting there; but they were obliged to adjourn to other premises.

Gas-Engines Spoiled and Robbed at Milan Gas-Works.—From our Italian contemporary "Il Gaz," we learn that thieves have again been active in their depredations at the Union des Gaz Company's works at Milan. At the San Celso works, there are several gas-engines employed to drive various coal-elevators and coke plants. They are in duplicate, in case of repairs and breakdowns, and they run generally for between two or three months before changing over. The engines in reserve are enclosed in small houses, and locked up. These precautions were, however, of no avail; for when it was desired to put the reserve gas-engines into action, it was found that the houses had been broken into and damaged. The thieves had taken away all parts in bronze, bearings, and other accessories from the engines, two of which were of 50 H.P. and three of 25 H.P. each. They were, of course, rendered quite unusable for the time; and 3000 lire (£120) will have to be spent to put them into running order once more. The offenders have, we understand, been discovered and arrested, and prove to be employees of the Company.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The remains of Mr. William Young were laid to rest in the burying-ground at Peebles on Tuesday afternoon, by a large company of sorrowing admirers of the great man, among whom were the Provost and Magistrates of the Royal burgh, and a very good representation of the gentlemen who had been associated with the deceased in one or other of the branches of his life-work. Though the grave is in a modern part, the burying-ground has been a place of sepulture for centuries. It is a somewhat plain place, considering the character of the scenery which surrounds the pleasant town of Peebles; but what of that? "After life's fitful fever, he sleeps well." The labourer rests, but his work goes on. It will by-and-bye go on in a way which none of his friends ever contemplated it would. The benefaction he has left for the foundation of a sanatorium was one which was scarcely to have been expected of him. We would rather have expected, if we had contemplated his leaving of his means for public purposes, that his selection would have been some of the schemes for the extension of technical education which are so much in the air at the present day. Perhaps Mr. Young foresaw that in time to come technical education will be a matter of State provision; or he may have concluded that a lot of the technical education which is provided in schools and colleges is not of much value. But suffering humanity we shall always have with us. His great heart felt for those whom he saw to be afflicted. Himself a sufferer of long standing, he seems to have thought that whatever means he had to spare would be best applied in the alleviation of the sufferings of mankind. Does this not come near to the teaching of the greatest of all hearts which ever beat in this world, in which even the giving up of a cup of cold water was commended? And in the fixing of the name of "The Harehope," instead of "The Young," sanatorium, is there not a most complete compliance with the injunction not to do alms before men, to be seen of them, nor to let the left hand know what the right hand may be doing? These are thoughts which ought to be borne in mind when estimating the value of the great gift which Mr. Young has given to Peebles—a gift the full beneficence of which will be realized more and more with the advent of the ages.

The Scottish Junior Gas Association—Eastern District—held their last quarterly meeting for the session in Edinburgh on the 2nd inst. They have one more engagement before they go into vacation—a visit to the Broxburn Oil-Works on the 30th inst.; otherwise their winter's work is over. They have had a session which, as the President remarked, they have reason to be proud of. They have succeeded in carrying on the business of the session entirely by themselves; and there has been no sign of the enthusiasm with which the movement was started being allowed to flag. The meeting was a very good one indeed. Mr. Lill, who gave the paper on "Gas-Governors," is a Foreman Engineer in the employment of Messrs. James Milne and Son, Limited, in which capacity he has acquired experience in the handling and working of gas-governors, which enabled him to clothe his description of the different governors on the market with an amount of information as to details which lifted his communication above the character of a shop production, and converted it into a technical lecture. Disclaiming the giving of anything new, he crystallized the knowledge of the trade upon existing plants, bringing out the special features of the different types, making it, without doubt, easier for his hearers to handle a governor than they have, till now, experienced it. Then Mr. Leech's paper on elevators and conveyors was a very complete synopsis of the special qualifications of the different types of plant in use for these labour-saving purposes. He forced the conviction upon his hearers that the author of it had had a thorough and a wide experience of the subject he was treating upon. Mr. Leech has seen service both at home and abroad; and his reasonings show him to be not only thoroughly familiar with general principles, but a master of detail, ready with a reason for every view which he holds, down to the nature of the bolts and rivets to be employed. It was a noteworthy feature of both communications that they were pitched on the groundwork of personal experience, and had not the slightest smattering of the text-book or the class-room—a quality which adds greatly to the value of every production.

Edinburgh being one of the chief centres in which the manufacture of gas-meters is carried on, the Deputy Warden of the Standards has sent a communication to the Magistrates of that city, asking for any suggestions they may have to make with reference to proposed amendments of the Sale of Gas Act, 1859. The Magistrates procured a report from the Inspector of Gas-Meters—their own servant—upon the subject. They considered this report yesterday. The Inspector recommended that a range pressure of from 0·5 inch to 1 inch should be allowed. The present statutory pressure is 0·5 inch; and it is found that in many instances a meter will not work at so low a pressure. The Inspector also recommended that power should be taken to reject meters which, in testing, although registering correctly, in consequence of fault in mechanism showed unsteadiness or jumping of light, and that meters should be re-verified after a number of years. It was further recommended that, in the testing of meters *in situ*, the test should be with the pressure on the main. The Magistrates adopted the recommendations. With reference to the number of years after which re-verification should take place, six years was proposed; but, by a majority, the period of ten years was adopted. It is to be hoped that the Standards Department will go further than take the opinion of officials engaged in the administration of the statute. The meter makers have a large interest in the matter, and surely they will be consulted. The proposals of the Inspector in Edinburgh are certainly open to criticism. If a pressure of 5-10ths of an inch is found to be too low to drive a meter, let the pressure be raised to what would be sufficient. But a range of pressures would be a complicated matter to work, and might lead to the harassing of meter makers. The raising

of the standard of pressure might, again, be a matter of difficulty, because the minimum pressure of gas supply is, quite commonly, 6-10ths. There is room for discussion here. Power to reject unsteady meters should not be required, because it is not in the interest of any gas-meter maker to supply an unsteady meter. Besides, if the power were given, might it not be a fruitful cause of trouble between suppliers of gas and consumers? Whenever gas-lights became unsteady, whether rightly or wrongly, the meter would be blamed, and it would have to come out and be tested. Then, if the meter were found to be correct in every way, and the consumer had to pay for the testing, he would grumble. The testing of gas-meters *in situ* at the pressure on the main is almost a necessity. The re-verification of meters after ten years would not give much trouble, nor cause much expense, in towns where testing apparatus exists; but if all the meters in other towns were obliged to be sent to a testing centre every ten years, the cost of carriage would be considerable. There would also be the necessity for increasing the amount invested in meters, because when a meter was sent away to be tested—and no one could say how long it would be away—another would have to be put in its place. For these, and probably for other, reasons, the recommendations of the Magistrates of Edinburgh require to be carefully looked into.

Mr. W. Wilson, the new Gas Engineer and Manager at Falkirk, has had a busy time during the past ten days. On the evening of Wednesday of last week, he and Mrs. Wilson entertained the gas-works staff in their own house; a very pleasant evening being spent. On the succeeding evening, Mr. and Mrs. Wilson were the recipients of handsome gifts, which had been subscribed for by the officials of the Kirkintilloch Town Council, the gas-works staff, and a few friends. The presentation was made by Dr. Whitelaw, the oldest Corporation official, who paid a high tribute to the abilities shown by Mr. Wilson during the five-and-a-half years he had been Manager at Kirkintilloch, pointing out how he had, by his chemical knowledge, checked waste and cheapened the gas down to an unprecedented rate. Since he came to Kirkintilloch, the town had never been for five minutes without gas; and no fatal accident had taken place under his reign. They parted from him with regret; but congratulated him upon his good fortune. The presentations consisted of a roll-top escritoire for Mr. Wilson, and a gold bracelet for Mrs. Wilson. Mr. Wilson said that the little he had been able to do had been brought about by the able assistance he had had from the staff, who were a very dutiful and trustworthy lot of men. Although the public might not have known it, the town had been on the verge of darkness on several occasions, and had it not been for the way the men rushed into the breach, not sparing themselves, the town would undoubtedly have been on short rations at least. He left his friends at Kirkintilloch with great regret; but he would always remember them. Having thus taken formal farewell of his old place, Mr. Wilson took over his new duties at Falkirk on the morning of Monday last. The following day, he took part in the inauguration of the work in connection with the erection of a new gasholder at Falkirk, the Contractors for which are Messrs. Robert Dempster and Sons, Limited, of Elland. Bailie Bogle, the Convener of the Corporation Gas Committee, drove the first four rivets in the ironwork; the Town Clerk—Mr. Balfour Gray—drove the second four; and Mr. Wilson the third four. The ceremony was a private one. The new holder and tank are estimated to cost £10,750.

The further hearing of evidence in the action by Messrs. James Muir and Son, Limited, against the Edinburgh and Leith Gas Commissioners, with reference to the pollution of a brewery well, was to have been taken on Tuesday and Wednesday, but it has been postponed, at the request of the Commissioners, who have not yet concluded their searching underground for the source of the pollution. The case is now enrolled for Monday, May 20, by which time the Commissioners expect to be ready to lay the results of their mining operations before the Court. It has been arranged that the new evidence will be taken by Lord Ardwall, who tried the case in the Outer House.

The Lord Provost's Committee of the Edinburgh Town Council this week considered the proposal to have apparatus fitted up in the Municipal Chambers, for the use of the City Analyst in testing the illuminating power of the gas and electric lighting supplied. They resolved to recommend that apparatus to test the gas be fitted up, at a cost of £100; and for the testing of the electric light, at a cost of £10. What is the apparatus for testing the candle power of electricity? Would a bar photometer not do?

The Directors of the Larkhall Gas Company, in their report, stated that the net available balance for distribution for the past year amounted to £1482. They proposed the outlay of £600 of this sum in paying a dividend of 10 per cent., the placing of £200 to the reserve fund, and the carrying forward of £682. These proposals have been adopted, and power has been given to the Directors to increase the capital of the Company by £3000.

The Corporation of Peterhead have accepted the tender of Messrs. Henry Balfour and Co., Limited, of Leven, Fife, amounting to £1937, for the work, recently detailed in these "Notes," in connection with the extension of the gasholder capacity in the works.

Under a new regulation for the lighting of common stairs, which came into force on Dec. 5 last, there were prosecutions, in the Police Court of Dundee, on Saturday last, of eight proprietors and house actors, against whom the charge was that they had failed to comply with notices requiring them to attend to the lighting of stairs in their properties. One case was withdrawn, three others were continued, and evidence was led regarding the others. Bailie Melville, who presided, said as the cases before him were of the nature of test cases, he would limit the penalties to fines of 5s. each, with the alternative of imprisonment for 24 hours.

I mentioned in the "JOURNAL" for Feb. 26 that Mr. J. C. Robertson, C.A., the Auditor of the Dundee Water Accounts, had surcharged upon ex-Bailie Ballingall, the Convener of the Water Committee, £24 of the £104 which the annual inspection in June last of the water-works at Lintrathen cost. Since then the Town Clerk of Dundee, who is also Clerk to the Water Commissioners, prepared a report upon the subject, in which he expressed his opinion that the Auditor had exceeded his powers. In his opinion, all that the Auditor could do was to call attention to any payment which he might consider to be unauthorized expenditure, and leave it to the Commissioners to do what they might consider fit to obtain a legal remedy—which is by application to the Sheriff. The report was submitted to a meeting of the Town Council as Water Commissioners on Thursday night. There was an angry discussion; one of the councillors being accused of having stirred up the Auditor to take the action he did. In the end, it was resolved, by 14 votes to 12, that no further action should be taken.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 673.

Issue.	Share.	When Div.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 12	10½	Alliance & Dublin 10 p.c.	21—22	..	4 15 5
245,112	10	,,	7⅛	Do. 7 p.c.	14½—15½	..	4 10 9
200,000	5	Nov. 14	7	Bombay, Ltd.	6⅞—7⅛	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	5—5⅜	..	5 1 10
50,000	10	Feb. 28	14	Bourne-mouth Gas and Water } 10 p.c. Pref. 6 p.c. B 7 p.c.	27—28*	..	5 0 0
51,810	10	,,	7		16½—17*	..	4 2 4
53,200	10	,,	6		14½—15½*	..	3 17 5
380,000	Stk.	,,	12½	Brentford Consolidated	250—255*	..	4 18 1
300,000	,,	,,	9⅜	Do. New	190—195*	..	4 17 5
50,000	,,	,,	5	Do. 5 p.c. Pref.	117—122*	..	4 2 0
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb.	101—104	..	3 16 11
220,000	Stk.	Sept. 27	11½	Brighton & Hove Orig.	225—230	..	4 17 10
246,320	,,	,,	8½	Do. A. Ord. Stk.	163—168	..	4 18 3
460,000	20	Sept. 27	10	British	42—43	..	4 13 0
104,000	Stk.	Feb. 28	6	Bromley, Ord. 5 p.c.	118—122*	..	4 18 4
165,700	,,	,,	4½	Do. do. 3½ p.c.	89—93*	..	4 16 9
500,000	10	Oct. 12	7	Buenos Ayres (New) Ltd.	11⅛—12	..	5 16 8
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
150,000	20	July 12	8½	Cagliari, Ltd.	24—26	..	6 6 11
100,000	10	Sept. 27	10	Cape Town & Dis., Ltd.	14—15	..	6 13 4
100,000	10	Oct. 26	4½	Do. 4½ p.c Pref.	8⅛—9⅜	..	4 14 9
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	50—52	..	5 15 5
50,000	Stk.	Dec. 28	4½	Do. 4½ p.c. Deb. Stk.	56—98	..	4 11 10
157,150	Stk.	Feb. 28	5	Chester 5 p.c. Ord.	109—111*	..	4 10 1
1,443,280	Stk.	,,	5⅛	Commercial 4 p.c Stk.	107—110*	..	4 14 6
560,000	,,	,,	5	Do. 3½ p.c. do.	105—108*	..	4 12 7
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	83—85	..	3 10 7
800,000	Stk.	,,	6⅛	Continental Union, Ltd.	122—125	—1	5 4 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	138—143	..	4 17 11
460,170	Stk.	Aug.	5½	Derby Con. Stk.	122—124	..	4 8 9
55,000	,,	Jan.	4	Do. Deb. Stk.	103—105	..	3 16 2
486,090	10	Jan. 31	11	European, Ltd.	24½—25½	..	4 6 3
354,060	10	,,	11	Do. £7 10s. paid	18—19	..	4 6 10
15,203,110	Stk.	Feb. 14	4⅛	Gas-light and Coke } 4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb.	95—97	..	4 10 10
2,600,000	,,	,,	3½		87—89	..	3 18 8
3,799,735	,,	,,	4		106—108	..	3 14 1
4,193,975	,,	Dec. 13	3		84—86	..	3 9 9
258,740	Stk.	Sept. 13	5	Hastings & St. L. 3½ p.c.	98—103	..	4 17 1
82,500	,,	,,	6⅓	Do. do. 5 p.c.	118—121	..	5 7 5
70,000	10	Oct. 12	11	Hongkong & China, Ltd.	19½—20½	..	5 7 4
4,940,000	Stk.	Nov. 14	8	Imperial Continental	179—182	..	4 7 11
473,600	Stk.	Feb. 14	3½	Do. 3½ p.c. Deb. Red.	93—95	..	3 13 8
184,602	Stk.	Aug. 30	6	Lea Bridge Ord. 5 p.c.	120—125	..	4 16 0
306,083	,,	Dec. 28	4	L'rpool Unit'd Deb. Stk.	110—112	..	3 11 5
561,000	Stk.	Feb. 28	10	Liverpool United A	223—225*	..	4 8 11
718,100	,,	,,	7	Do. B	164—165*	..	4 4 10
144,140	Stk.	Feb. 14	7⅛	Maidstone 5 p.c.	142—147	..	5 3 8
75,000	5	Nov. 29	5	Malta & Medn., Ltd.	4¼—4½	..	5 5 3
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	101—103	..	4 17 1
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	101—103	..	4 7 5
541,920	20	Nov. 14	3½	Monte Video, Ltd.	11½—12⅛	..	5 12 0
1,775,892	Stk.	Feb. 28	4⅛	Newc'tle & G'tesh'd Con.	107—109*	..	4 4 10
406,025	Stk.	Dec. 28	3½	Do. 3½ p.c. Deb.	96—97	..	3 12 2
15,000	10	Feb. 28	10	North Middlesex 10 p.c.	19½—20½*	..	4 17 7
55,940	10	,,	7	Do. 7 p.c.	13—14*	..	5 0 0
300,000	Stk.	Nov. 29	8	Oriental, Ltd.	150—155	..	5 3 3
60,000	5	Sept. 13	7	Ottoman, Ltd.	6—6½	..	5 7 8
398,490	5	Oct. 26	7	Primitiva Ord.	7⅜—8⅛	..	4 6 2
796,980	5	Jan. 31	5	Do. 5 p.c. Pref.	5—5¼	..	4 15 3
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	95—97	..	4 2 6
851,070	10	Oct. 12	7	River Plate Ord.	12¼—12⅜	..	5 7 8
300,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	95—97	..	4 2 6
250,000	10	Sept. 27	8	San Paulo, Ltd.	13—13½	..	5 18 6
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	48—50	..	5 0 0
135,000	Stk.	Sept. 13	10	Sheffield A	248—250	..	4 0 0
209,984	,,	,,	10	Do. B	248—250	..	4 0 0
523,500	,,	,,	10	Do. C	248—250	..	4 0 0
70,000	10	Oct. 26	10	South African	15½—16½	..	6 1 3
6,350,000	Stk.	Feb. 14	5⅓	South Met., 4 p.c. Ord.	123—125	—1	4 8 0
1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	84—86	..	3 9 9
201,720	Stk	Sept. 13	8	South Shields Con. Stk.	158—160	..	5 0 0
605,000	Stk.	Feb. 28	5⅓	S'th Suburb'n Ord. 5 p.c.	120—123*	..	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref.	120—123*	..	4 1 4
117,058	,,	Jan. 16	5	Do. 5 p.c. Deb. Stk.	125—130	..	3 16 11
502,310	Stk.	Nov. 14	5	Southampton Ord.	107—112	..	4 9 3
120,000	Stk.	Feb. 28	6½	Tottenham and A 5 p.c. B 3½ p.c.	123—126*	..	5 3 2
398,940	,,	,,	5		101—103*	..	4 17 1
137,500	,,	Dec. 28	4	Edmonton 4 p.c. Deb.	101—103	..	3 17 8
182,380	10	,,	8	Tuscan, Ltd.	10½—11	..	7 5 6
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	102—104	..	4 16 2
193,742	Stk.	Feb. 28	5	Tynemouth 5 p.c. max.	104—106*	..	4 14 4
30,000	Stk.	Feb. 14	8	Wandsworth and Putney A 5 p.c. B 3½ p.c. C 3½ p.c. 3 p.c. Deb. Stk.	—	..	—
255,636	,,	,,	6½		138—143	..	4 10 11
75,000	,,	,,	5⅔		111—113	..	4 19 1
79,416	,,	Dec. 28	3		79—82	..	3 13 2
845,872	,,	Feb. 28	5⅓	West Ham 5 p.c. Ord.	101—104*	..	4 18 6
185,000	,,	,,	5	Do. 5 p.c. Pref.	120—123*	..	4 1 4
228,300	,,	Dec. 28	4	Do. 4 p.c. Deb. Stk.	102—105	..	3 16 2

Prices marked * are "Ex div."

CURRENT SALES OF GAS PRODUCTS.

Week ending March 9.

Tar products in the London market remain steady. Pitch has again been in very good demand, and from 27s. 6d. to 28s. is now the quotation. In some cases 27s. 6d. even has been declined. Higher prices have again been paid for creosote, more especially for local consumption. The price can now be called 2¼d. to 2⅜d. at makers' works. Benzol, 90 per cent., is hardly so good, and stands at between 10½d. and 10¾d. 60° crude carbolic is without change; but crystals are much easier. The feeling as to anthracene is distinctly better, and 1¾d. per unit for 40 to 45 per cent. has been freely bid, and more business has been done at the price. Although shipments of sulphate of ammonia have been extremely good this season, the price does not improve, but on the other hand is actually a little lower; the value on Beckton terms being to-day £12 to £12 2s. 6d. per ton for prompt, and barely that price could be obtained for further forward. Sulphate of ammonia is so much cheaper per unit than nitrate of soda at the present time that more attention is being given to the former; and it is difficult to understand why the price does not improve.

LIVERPOOL, *March* 9.

Sulphate of Ammonia.

In the early part of the week, prices were somewhat irregular, owing to the second-hand selling. Later, however, there has been more buying; and, supplies not being too abundant, the market closes with a rather firmer tone. The quotations are £11 17s. 6d. per ton f.o.b. Hull, £11 18s. 9d. to £12 per ton f.o.b. Liverpool, and £12 to £12 2s. 6d. per ton f.o.b. Leith. There has been considerable inquiry in the forward position; but while makers are looking for a premium on prompt prices, buyers do not seem inclined to operate unless at a discount. In making overtures for business, buyers are not in fact very serious. Consequently, actual transactions have only been on a limited scale.

Nitrate of Soda.

This article remains very firm, and spot prices are maintained at 11s. 6d. per cwt. for 95 per cent., and 12s. per cwt. for refined quality.

LONDON, *March* 9.

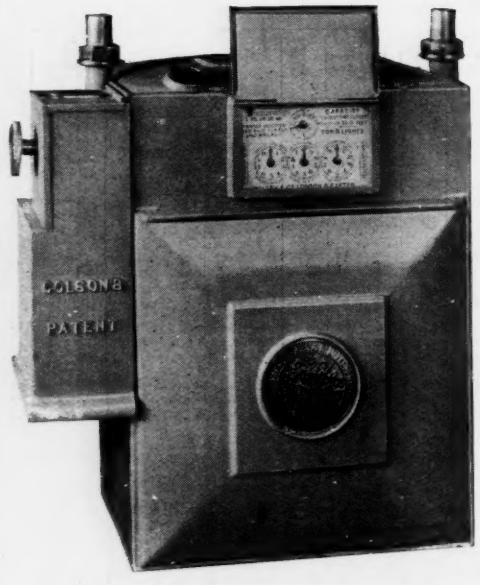
Tar Products.

There has been little alteration in the market during the past week. Pitch has maintained its position; and it is evident that the London manufacturers are now pretty well sold, having cleared out for the present the quantities which they wished to dispose of for this half of the present year. On the east coast, business is reported to have been done at 25s. 6d. for the best Yorkshire makes. On the west coast, business could still be done at outside ports at 24s. Consumers in South Wales appear to be amply covered for their present requirements; while on the Continent, buyers are only interested for next season, and at present will not pay the prices indicated by dealers. Creosote is very firm indeed; and a small quantity of London oil is reported to have been sold at a good figure for prompt delivery. Manufacturers themselves are out of the market just at present, preferring to await the course of events before selling any further quantity. In the Midlands, oil is very scarce indeed, and good prices are reported to have been paid; while in the North, manufacturers prefer to wait before selling any further quantity. Benzol, 90 per cent., is very quiet indeed, and business is said to have been done f.o.b. London at 11d. per gallon; while on the east coast, 10d. is stated to have been accepted. Benzol, 50 to 90 per cent., is scarce, and in good demand. The quantity of toluol offering is decidedly small, and good prices are paid for same. Solvent naphtha is quiet. Business is reported to have been done at 1s. 1½d. on the east coast; while a country make was offered at 1s. 3d., on rails London, without success. Some quantity of good "A" quality anthracene was sold at 1⅝d. per unit delivered to consumers' works; and for inferior makes, only 1¼d. was realized on the same terms. Carbolic acid is easier. Continental consumers report having purchased at 1s. 8¼d. on the east coast, and now refuse to offer more than this figure; while English consumers will only pay the parity of this at makers' works. Crystals are quiet; and it is probable that makers would accept something under current quotations for a good contract.

The average values during the week were: Tar, 13s. 6d. to 17s. 6d. Pitch, London, 26s. to 26s. 6d.; east coast, 25s. to 25s. 6d.; west coast, 24s. to 24s. 6d. Benzol, 90 per cent., 10d. to 11d.; 50-90 per cent., 11½d. to 1s. Toluol, 1s. 1½d. to 1s. 2½d. Crude naphtha, 4¾d. to 5d.; solvent naphtha, 1s. 1½d. to 1s. 2½d.; heavy naphtha, 1s. 3d. to 1s. 4d. Creosote, London, 2½d. to 2⅝d.; North, 2d. to 2⅛d. Heavy oils, 2⅜d. Carbolic acid, 60 per cent., 1s. 8¼d. to 1s. 8½d. Naphthalene, £6 to £10; salts, 35s. to 40s. Anthracene, "A" quality, 1½d. to 1⅝d.

Sulphate of Ammonia.

This article has been decidedly quiet during the past week, and prices have had a downward tendency. The principal London makers still maintain their price of £12 2s. 6d. on their own special terms; but business could be done upon f.o.b. London terms at £11 17s. 6d. In Hull, buyers have refused to give £12 for one of the best makes; and it is improbable that anything over £11 15s. to £11 16s. 3d. could be secured for ordinary qualities for prompt delivery. In Liverpool, business is reported at £11 17s. 6d. and £11 18s. 9d., but only for small quantities. In Leith, manufacturers are well sold, and are unable to entertain further business just at present; but they certainly would not be able to secure anything over £12 were they in the market.



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COAL TRADE REPORTS.

Lancashire Coal Trade.

General firmness characterizes the Lancashire coal trade. Prices in all branches are well maintained. There is no likelihood of any variation in terms until after Easter, if then. The wages question is in abeyance. Many railway and other contracts terminate this month, and a good deal of correspondence as to new contracts is passing between colliery proprietors and railway companies, mill owners, and gas manufacturers. In the present state of the market, it is certain that more money will have to be paid by contractors. The weather continues in favour of sellers. Coal exports from the Ship Canal continue in enlarged quantities. Welsh coal is cheaper; the best "Admiralty" being from 2s. 6d. to 3s. less than a month ago. The average quotations at the Manchester Coal Exchange are as follows: At the pits, best house coal 14s. 6d. to 15s. 6d. per ton, secondary 13s. 6d. to 14s. 6d., common 10s. 6d. to 12s. 6d., burgy, 8s. 10d. to 9s. 6d., best slack 8s. to 9s., medium and common 7s. to 8s., coal for export and bunkering 12s. to 13s. f.o.b. at Garston. Furnace coke is scarce and dear, varying from 17s. to 24s.

Northern Coal Trade.

There is still some irregularity in the coal trade of the North-east—on the one hand, the more settled weather having allowed the shipments, coastwise and foreign, to be increased; but on the other, there is the falling off in the local consumption which is usual in periods of milder weather. Steam coals continue rather quiet. Best Northumbrians are from about 14s. 3d. to 14s. 6d. per ton f.o.b.; second-class steams are 13s.; and steam smalls are firm at 8s. 3d. to 8s. 6d. The production at the pits seems to be full, and to be well taken up. In the gas coal trade, owners still report a very full demand, and appear to adhere to the prices that have been recently quoted, though buyers look for some ease as the season advances. Durham gas coal is still quoted, according to quality, from about 12s. to 13s. per ton f.o.b., with one or two special kinds at perhaps 3d. per ton above the higher price; and some sales for export are being made—though not in large lots. There is nothing to add to what was stated last week as to the long contracts—buyers seem to believe in waiting. In the coke markets there is further ease, which would influence gas coke if it were not for the lessening output of the latter. Good gas coke varies from 13s. 9d. to 14s. 9d. per ton f.o.b.; and the stocks seem to be generally less than they were, while the demand is relatively steadier.

Scotch Coal Trade.

Coal continues to be in great request, and prices are at present higher than they have been since the rise began, without, too, any prospect of their coming down. The demand for export is exceptionally strong. The prices quoted are: Ell 12s. 6d. to 13s. 9d. per ton f.o.b. Glasgow, splint 13s. to 13s. 6d., and steam 12s. to 12s. 3d. The shipments for the week amounted to 291,695 tons—an increase of 72,849 tons upon the previous week, and of 65,476 tons upon the same week of last year. For the year to date, the total shipments have been 2,084,686 tons—an increase of 109,743 tons upon the corresponding period of 1906.

Pontefract Gas Arbitration Award.

On the 4th ult., and several subsequent days, an arbitration took place at the Surveyors' Institution—with Sir Hugh Owen as Umpire—to fix the price to be paid by the Pontefract Corporation for the undertaking of the local Gas Company (*ante*, pp. 415, 484). The price claimed by the Company (for whom expert evidence was given by Mr. W. A. Valon, Mr. H. E. Jones, Mr. Henry Tobey, and Mr. Ernest W. Drew) was £89,016: while the Corporation's advisers (Mr. E. H. Stevenson, Mr. John Wilkinson, and Mr. W. B. Keen) valued the undertaking at £60,438. By his award, Sir Hugh Owen has fixed the sum to be paid at £69,600.

Price of Gas to Prepayment Consumers at Salford.—In reply to a question by Mr. Jackson as to whether the prepayment consumers paid 30 per cent. more for their gas than those using ordinary meters, Alderman Phillips, the Chairman of the Salford Gas Committee, said he did not believe the Gas Committee made a profit out of the slot meters. The people using them were charged 2s. 9d. per 1000 cubic feet; while the ordinary consumers paid 2s. 7d., with a deduction of 4d., making a net price of 2s. 3d. per 1000 cubic feet. Mr. Jackson retorted that he could not understand the argument that the penny-in-the-slot system was unprofitable.

Sales of Shares.—Messrs. Sadler and Baker offered for sale last Thursday 600 additional £10 shares in the Frimley and Farnborough District Water Company; and they fetched £14 10s. and £14 12s. 6d. each—an average of £14 10s. 8d. The total amount realized by the sale was £8718 15s. Tenders for the issue of £25,000 of "D" stock of the Croydon Gas Company, recently invited in our columns, were opened last Wednesday. The whole of the stock was allotted at prices ranging from £109 5s. to £112 per £100 of stock. The average price obtained was £109 6s. 10d.; applicants at the lower price receiving 92 per cent. of the respective amounts applied for.

Newquay District Council and the Water Bill.—As notified in our "Parliamentary Intelligence," the opposition to the Newquay and District Water Bill has been withdrawn. One of the main differences of opinion between the Urban District Council and the Water Company was as to the scale of charges; the Council contending that the differences in the present graduations are too great. It has been agreed by the Company to adopt the graduation proposed by their Bill of last year, subject to certain modifications and to a reduction in the charge for baths, &c. It has also been agreed that certain proposals by the Council as to capital shall be incorporated in the Bill.

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Gas Supply in the Colonies.

The Maryborough (Queensland) Gas Company, Limited, had a profit balance of £1058 for the six months ending the 31st of December last, and out of it a dividend at the rate of 6 per cent. per annum was declared at the half-yearly meeting on the 1st ult. This absorbed £771, and left a balance of £287 to be carried forward. The North Shore (Sydney) Gas Company, Limited, had a net profit of £5552 on the sale of gas, &c., in the second half of last year, after allowing for reserve and depreciation; and a sum of £32 was carried forward. Out of the total, a dividend of 3¾ per cent. (free of income-tax) was declared for the six months, amounting to £5621, and leaving £63 to be carried forward. The Directors reported at the recent half-yearly meeting that the Company's plant was in a very satisfactory condition. An installation of inclined retorts, with coal breaking and conveying plant, which had been put in, was stated to be working satisfactorily. In view of the rapid increase in the population of North Shore, the Directors have purchased about 10 acres of land at Table Bay, on which additional works can be erected when they are required.

Coal and Gas Consumption in American Cities.

The consumption of coal and gas per head in the six leading cities of the United States is given in a recent issue of "Stevens' Indicator" as follows:—

	Population.	Coal. Short Tons.	Gas. Cubic Feet.
New York	4,014,000	3·12	8800
Chicago	2,020,000	4·00	5840
St. Louis	714,600	7·55	5600
Boston	602,500	6·70	5120
Cleveland	465,000	5·43	3230
Cincinnati	425,000	8·20	5180
Average	1,374,000	4·42	7017

Of the total coal burned in these six cities, aggregating 36,428,000 short tons, 23,588,000 tons were bituminous, while the anthracite amounted to 12,840,000 short tons. The anthracite percentage was about 35. In the several cities the anthracite percentages were as follows: New York, 72; Chicago, 17; St. Louis, 3; Boston, 45; Cleveland, 13; Cincinnati, 1. Our contemporary the "Iron and Coal Trades Review," says the low consumption of coal per head in New York, with correspondingly high consumption of gas, is accounted for partly by the congested population, which tends to increase the number of apartment houses and hotels, where many families are supplied with heat from a single central plant, and where a large share of the cooking is done by gas-ranges, and partly because the city is so pre-eminently a commercial one, rather than strictly a manufacturing community, as is so largely the case with the others.

Automatic Street Lighting at Bournemouth.

In connection with a decision by the Bournemouth County Borough Council to renew their agreement regarding the use of automatic street-lamp controllers for a further period of twelve months, and to extend the system, the Lighting Inspector's report is of interest. He stated that during the past three months—viz., November, December, and January—of the lighting, extinguishing, &c., with the automatic controllers, the cost of gas was £209, as against £235 for the same number of lamps without controllers for the same period of the previous year, showing a saving of £26. As to the maintenance of mantles and cleaning of lamps, also the rent of automatic controllers, the cost of this was £86, as against £107, thus showing a saving on the maintenance account of £21. Assuming that the lamps along the main roads which are kept lighted all night were not fitted with controllers, and had to be extinguished by hand, it would necessitate the employment of two men for extinguishing them, at an additional cost of £12 10s. for the three months. The total amount saved for the above period was £60. The lighting, extinguishing, and cleaning of the lamps that are fitted with automatic controllers has been satisfactorily carried out during the past three months.

Reductions in Price.—The Directors of the Horley Gas Company have decided to reduce the price of gas 4d. per 1000 cubic feet as from the 1st of July next. The price of gas at Farnham has been reduced to 3s. 4d. per 1000 cubic feet as from the beginning of the year. The Directors of the Enfield Gas Company have decided to reduce the price of gas to 3s. 5d. per 1000 cubic feet to users of stoves, and to 3s. 2d. to ordinary consumers.

Berlin Water Supply.—The history of the supply of Berlin with water is set forth in a recent number of the "Gesundheits-Ingenieur." The matter was at first entrusted to an English Company, who obtained a concession for 25 years from July 1, 1856, to July 1, 1881. The Stralau works erected by them were in operation by April 1, 1856, and were capable of providing a daily supply for 300,000 persons. The additional works erected later on Lake Tegel and Lake Müggel are described; and the subsequent efforts made to obtain a supply of well water by sinking numerous tube wells are explained. In spite of difficulties caused by the amount of iron in solution, it has now been possible to reconstitute both of these works, and to obtain a daily supply of water from wells, amounting to 20 million gallons from Lake Tegel and 44 millions from Lake Müggel. These latter works will be fully completed in the spring of the present year. During last summer, the contemplated number of tube wells proved insufficient to yield the necessary volume of water, and considerable extensions in the length of the underground galleries had to be undertaken. It is stated that the volume of water per head of the population, for the 2 million inhabitants of Berlin and its suburbs for whom a supply is needed, is constantly on the increase, and the supply now reaches 30·8 gallons per head per diem.

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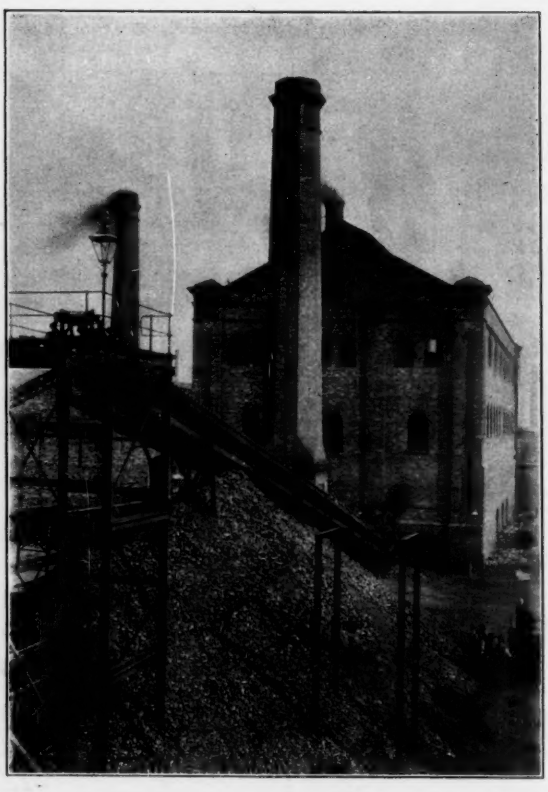

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The Boultham Boring at Lincoln.—Some weeks ago, the Lincoln City Council decided (*ante*, p. 421) to continue the deep boring at Boultham for some distance further, in the hope that, by passing into different strata, water more suitable for domestic purposes might be met with. This has been done; but it seems that, though the sandstone has been pierced right through, the quality of the water has not improved. There is, however, yet hope that if there is persistent pumping, with the pumps placed at the depth originally intended (400 feet), the water which has been long stagnant may be removed and a pure supply obtained. The one great disappointment is stated to be the fact that the gravel beds, which are the best water-bearing strata, have not been met with to any appreciable extent; but at the same time, there is an abundant flow of water.

Gas Profits and the Rates at Hereford.—An intimation by the Hereford Gas Committee that they had ordered the sum of £1000 to be transferred to the improvement fund at the end of the financial year, led to some discussion at last Tuesday's meeting of the Town Council. Mr. Langford protested against the transfer, though he admitted that their Special Act enabled the Council to adopt such a course. It was argued that such an arrangement saved a sewers rate; but he pointed out that this meant that the people who consumed gas paid the rate, which would otherwise be collected from the whole of the ratepayers of the city. Seeing the Committee secured such a large profit, they might consider the advisability of making a reduction in the price of gas. One of the results of the present high charge was that customers who had used Corporation gas for power purposes were now putting in suction-gas plant. Mr. Witts, however, remarked that the price was now only 2s. 6d. per 1000 cubic feet, and 2s. 3d. for power.

An exhibition of the gas cooking, heating, and lighting appliances of Messrs. R. & A. Main, Limited, and Messrs. Falk, Stadelmann, and Co., Limited, was held under the auspices of the Corporation of Dumfries, in St. Mary's Hall from Monday to Friday of last week. Messrs. Main had on view cookers of different types, and a large variety of gas-fires. Messrs. Falk, Stadelmann, and Co. had a profuse display of lighting appliances. The exhibition was opened by Provost Glover, who recommended the use of gas cooking-stoves and incandescent lighting as a means for reducing the expense of the home. Miss E. M. Dods, Principal of the Dundee School of Cookery, lectured twice daily during the week. The exhibition was well patronized, especially at lecture times.

In the report of the Directors of the Richmond Gas Stove and Meter Company, Limited, for the year ending Dec. 31 last, they state that the balance standing to the credit of the profit and loss account (after deducting debenture interest), including the amount brought forward, is £31,768, which they recommended should be appropriated as follows: Depreciation, £4819; dividend on preference capital at the rate of 6 per cent. per annum, £5933; dividend (free of income-tax) at the rate of 10 per cent. per annum on the ordinary capital, £8036; bonus (free of income-tax) at the rate of 2½ per cent. per annum, £2009; reserve fund (bringing it up to £40,000), £4671, the Directors add that the business of the Company continues to be satisfactory; and it is gratifying to them that they are able, after placing the entire cost of advertising, as in former years, against revenue, to again recommend a dividend at the rate of 10 per cent., and a bonus of 2½ per cent. in addition. During the year the sum of £15,433 was expended on the new foundry at Grappenhall. The report was submitted to the shareholders at the annual meeting of the Company last Thursday, and adopted; and the dividend recommended, with the bonus, was declared. In the course of the proceedings, the Vice-Chairman (Mr. H. M. Thornton) said the balance-sheet was by far the best they had produced.

The annual report which was adopted at the seventeenth ordinary general meeting last Thursday of John Wright and Eagle Range, Limited, showed that the profit for the year to Dec. 31, after providing for contingent reserve, and charging Directors' fees, Managing-Directors' remuneration, and depreciation on buildings and plant, amounted to £54,113. After adding the balance brought forward from last year (£8514), and deducting the interim dividend paid in August last (£17,948), there remained at disposal the sum of £44,679. The Directors recommended a dividend at the rate of 6 per cent. per annum for the half year on the preference shares, less income-tax; a dividend of 2s. 6d. per share on the ordinary shares, free of income-tax; £8000 to be taken to the reserve fund; and £8381 to be carried forward to next year. The Chairman (Mr. G. E. Wright) said he thought they would agree that the report showed a continuance of that steady progress which had characterized the Company since its formation. They had had to meet a very great advance in the cost of raw materials during 1906; but, unfortunately, they had not been able to obtain advanced prices for the goods they had to sell. The results shown, therefore, were slightly less favourable than last year; but they were eminently satisfactory. It would be interesting for them to know they had commenced 1907 with advanced prices; and they started the year under considerably more favourable circumstances than those which obtained last year. The latest branch of the business—the British Radiator Company—which they started some two years ago, was making steady progress, and promised to be a source of considerable profit and strength. It might strike some of them as peculiar that, though the profits were only £600 less than last year, they were carrying £2000 less to the reserve fund, and were also carrying forward a slightly smaller balance. If, however, they looked into the matter, they would easily see where the apparent difference arose. Last year they carried £10,000 to the reserve fund; but they did this at the expense of reducing the amount that was to be brought into the year. Therefore, whereas they had the sum of £9970 to bring into the accounts last year, this year they only had £8500. Dealing with the balance-sheet, he said that the whole of the increase of nearly £10,000 which had been spent during the year had been in adding to their buildings and plant. The report was adopted, and the dividends recommended were declared; it being pointed out that this was the tenth consecutive year in which the Company had paid 20 per cent. per annum.

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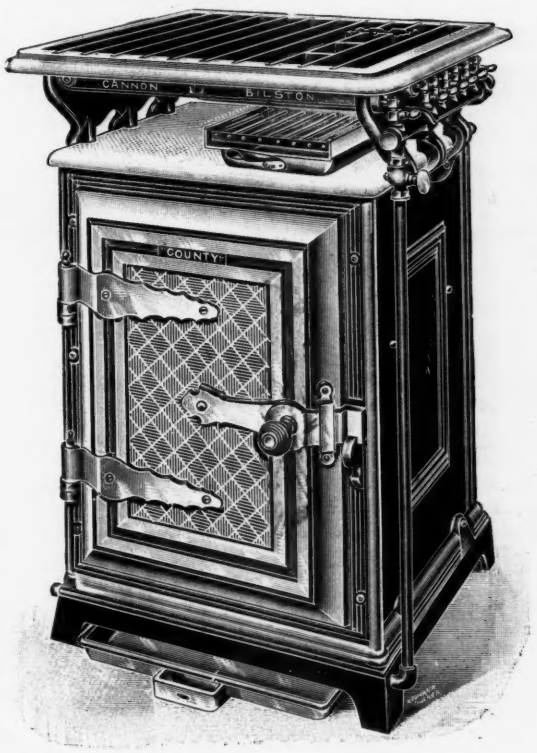

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Messrs. Joseph Taylor and Co. have received an order from the Runcorn Gas Company for one of their latest makes of solid plate lead saturators, delivered and fixed on their foundations; also one for an open saturator for the Bromley (Kent) Gas Company.

The Automobile Gas Producer Syndicate, with its office at No. 99, Great Clyde Street, Glasgow, was recently registered in Edinburgh. The capital is £3000, in £1 shares, for which the public are not invited to subscribe. The Silverwood Light Oil Company, Limited, has been registered, with a capital of £100, in £1 shares, to treat and manipulate coke-oven gases to extract benzol and other bye-products, &c.

The Lithgow (New South Wales) Borough Council have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for the apparatus, consisting of retort-bench, retort-house roof, condensers, purifiers, &c., required to re-model their existing gas-works.

Messrs. F. C. Sugden and Co. have had orders placed with them for a new retort-bench and ironwork (the settings being of the shallow regenerative type) by the Whitworth Vale Gas Company; and for semi-deep regenerator settings and ironwork by the Llangollen Gas Company, Limited, and the Bridgend Gas and Water Company—the last one being a repeat order.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

MANAGER. Crowborough Gas Company. Applications by March 16.
DRAUGHTSMAN. Newton, Chambers, and Co.
DRAUGHTSMAN. No. 4734.
DRAUGHTSMAN. No. 4741.
CHEMIST. No. 4740.
OUTDOOR SUPERINTENDENT. Devonport Gas Department. Applications by March 22.
GENERAL FOREMAN. No. 4739.
METER INSPECTOR. Warwick Gas-Works.
SHOW-ROOM MANAGER AND SALESMAN. Folkestone Gas Company.
COAL REPRESENTATIVES. No. 4736.
FITTER. No. 4737.
MAIN AND SERVICE LAYER. Devonport Gas-Works.

Situations Wanted.

ASSISTANT-MANAGER OR DRAUGHTSMAN. No. 4731.
INDEX READER AND OFFICE WORK. 50, Woodward Road, East Dulwich.
MANAGER, ASSISTANT-MANAGER, &c., OF WATER-WORKS. No. 4735.
WORKING FOREMAN. No. 4738.

Plant, &c., For Sale.

COMPLETE GAS PLANT. C. B. Butcher, Cranbrook.
GAS-ENGINE. "G.S.," c/o West End Advertising Agency.
GAS-PIPES (6-INCH). Broom and Wade, High Wycombe.

Company Meeting.

BRITISH GASLIGHT COMPANY. Offices. March 27. Twelve o'clock.

Stocks and Shares.

ALDERSHOT GAS AND WATER COMPANY. March 19.
BRIGHTON AND HOVE GAS COMPANY. March 19.
LEATHERHEAD WATER COMPANY. March 25.
NEWPORT (MON.) GAS COMPANY. March 22.
NORTH MIDDLESEX GAS COMPANY. April 8.
PINNER GAS COMPANY. March 21.
SOUTHGATE AND DISTRICT GAS COMPANY. March 19.
TENDRING HUNDRED WATER COMPANY. March 19.

TENDERS FOR

Coal.

COMMERCIAL GAS COMPANY. Tenders by March 14.
PERTH GAS DEPARTMENT. Tenders by March 23.
STOCKPORT GAS DEPARTMENT. Tenders by March 21.

Coke.

WANDSWORTH AND PUTNEY GAS COMPANY. Tenders by March 18.

Fire-Clay Goods.

STOCKPORT GAS DEPARTMENT. Tenders by March 21.

General Stores, Shovels, Picks, Oils, Ironmongery, Brass and Copper Work, Fittings, Lime, Lead, Lead Pipe, &c., &c.

PERTH GAS DEPARTMENT. Tenders by March 23.
ROCHDALE GAS DEPARTMENT. Tenders by March 20.
STOCKPORT GAS DEPARTMENT. Tenders by March 21.

Iron and Steel Work, Castings, &c.

BURY CORPORATION. Tenders by March 19.
ROCHDALE GAS DEPARTMENT. Tenders by March 20.
STOCKPORT GAS DEPARTMENT. Tenders by March 21.

Mantles.

STOCKPORT GAS DEPARTMENT. Tenders by March 21.

Meters.

LEEDS GAS DEPARTMENT. Tenders by March 25.
PERTH GAS DEPARTMENT. Tenders by March 23.
STOCKPORT GAS DEPARTMENT. Tenders by March 21.

Oxide of Iron.

EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by March 25.
STOCKPORT GAS DEPARTMENT. Tenders by March 21.

Pipes, &c.

PERTH GAS DEPARTMENT. Tenders by March 23.
ROCHDALE GAS DEPARTMENT. Tenders by March 20.
STOCKPORT GAS DEPARTMENT. Tenders by March 21.

Sulphuric Acid.

EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by March 25.
PERTH GAS DEPARTMENT. Tenders by March 23.

Tar and Liquor.

HAWORTH URBAN DISTRICT COUNCIL. Tenders by March 22.

Water-Gas Plant.

WIGAN GAS DEPARTMENT. Tenders by April 2.

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

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